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Environmental Protection Agency, Atlanta, GA Region IV

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United States
Environmental Protection
Agency

Region 4
345 Courtland Street, NE
Atlanta, GA 30308

EPA 904/9-78-012-B
JULY 1978

DRAFT

EPA

Environmental Impact Statement

Occidental Chemical Company
Swift Creek Chemical Complex
Hamilton County, Florida

Resource Document
Volume II

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This Draft EIS concerns the issuance of an NPDES permit to Occidential Chemical Company for the construction of a new chemical plant in Hamilton County, Florida. The construction of the new Swift Creek Chemical Complex is part of a two-phased plan to increase the superphosphoric acid capacity of the north Florida phosphate fertilizer manufacturing complex. The facility will require approximately 50 acres for the plant and 275 acres each for a gypsum stack and cooling pond. Potential sources of pollution are air emissions (suflur dioxide, particulates, and fluorides), process water and nonprocess water. Impacts of emissions on air quality and surface and ground water were examined.

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2.7 BIOLOGY AND ECOLOGY

of the area.

Basic study units for the biological and ecological characterization include Swift Creek, the upper portion of the Suwannee River and the land area within five miles of the proposed chemical complex. Existing communities are described in terms of their location, extent, species composition, trophic structure and successional status. Ecosystem concepts are introduced and used where appropriate to describe functional interrelationships between communities and between the biotic and physical components of the environment. Identification of ecosystem interrelationships is essential to an assessment of the functional role of biological communities and to indicate potential mechanisms of impact transmission. +

2.7.1 AREA ECOSYSTEM MODIFIERS

The community characteristics within the five mile study area and the Swift Creek watershed derive primarily from the physical setting (i.e., topography, rainfall and soils) and local land use. An understanding of communities as functional units or ecosystems requires an understanding of the interrelationship between local physical features, cultural influences and the biota (Figure 2.7-1).

The physical setting, which is a primary determinant of community composition and form within any given area, is an integral component of the local ecosystem (Section 2.7.1.2). Land use or cultural modifications are an "outside" influence which forces the ecosystem (i.e., forcing function) into an atypical configuration. These land use modifications, which represent a set of on-going stress factors, are briefly described (Section 2.7.1.1) to provide a realistic perspective from which to evaluate potential, project-related impacts.

2.7.1.1 Culturally Derived Natural System Forcing Functions

Five major culturally derived system modifiers or forcing functions are presently operative on the local ecosystem. These are the Suwannee River Chemical Complex, large-scale forest management, agriculture, stream channel modifications, and ongoing mining and reclamation.

2.7.1.1.1 The Suwannee River Chemical Complex -- The Suwannee River Chemical Complex (SRCC), located approximately 4 miles east of the proposed Swift Creek Chemical Complex (SCCC), has operated since 1965. It is a major permitted contributor of water and materials to Swift Creek (EPA 001-1). The Swift Creek base flow is derived primarily from operation of the SRCC and associated mining operations. The discharge is routed through and can be held in Altmans Bay Lake. This retention pond discharge provides a plankton input to the Swift Creek system which is atypical of area streams.

2.7.1.1.2 Large-Scale Forest Management -- Forest management is a major land use in the area of concern with about 80 percent of the land within five miles of the plant site being commercially owned forest (Florida Division of Forestry, 1978). Most of this commercial land (∿ 90 percent) is owned and managed primarily for pulpwood production, by either Owens-Illinois (∿55 percent) or Continental Can (∿35 percent). The forest industry owns

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about 44 percent of the Hamilton County land area (57 percent of the total forested acreage).

Management practices primarily affect pine communities (Section 2.7.3.1.1), though all of the forest lands in the area have been cut over at some time. Intense management, which is practiced on most of the pinelands in the area of interest, is directed toward increasing pine growth and volume, at the expense of overall plant community diversity. Management practices in any pine stand may include site drainage, an approximate 25 year rotation consisting of clear-cutting followed by site preparation and planting, selective thinning, and periodic burning or culling to remove competing or unhealthy trees. This loss of plant community diversity in intensely managed or site prepared areas is known to cause a corresponding loss in wildlife diversity (White, et al., 1975). The intensity of forest management in the area of concern has undoubtedly altered the upland wildlife characteristics of the area relative to its native situation.

2.7.1.1.3 Agriculture and Other Land Uses -- Agriculture and other system modifiers, such as urban and residential development, roadways and transmission corridors, are intense forms of land use which result in essentially a complete replacement of native community types by structures and/or monocultural or low diversity habitats. An increase of such land uses in an area is consistent with a decline in native flora. However, native wildlife components do not necessarily show a corresponding decline since some animals will, respond positively to a loss of native cover through improved habitat diversity, and increased habitat edge and feeding resources.

The impact of these land uses is not confined to the affected land-based communities. Loss or modification of native cover will increase both the volume of water and the concentration of suspended and dissolved materials in local runoff. Runoff from agricultural and developed watersheds is considered to be a nonpoint source of pollution.

Based on analysis of watershed characteristics and stream nutrient runoff data compiled from a nationwide network of 928 nonpoint source watersheds (EPA, 1977), it was found that streams draining agricultural watersheds had, on the average, considerably higher nutrient concentrations than those draining forested watersheds. In fact, nutrient concentrations were generally proportional to the percent of land in agriculture as compared to forest.

Urban and residential development is insignificant within five miles of the proposed plant site roadways, rail-lines and transmission corridors account for a minor portion of the assessment area acreage. However, cropland presently occupies about 6,031 acres within the study area (12 percent of total acreage) mostly located near the Suwannee River and the lower portion of Swift Creek where soil drainage is improved over that of surrounding flatlands (Figure 2.7-2, Section 2.7.1.2.1). This concentration of agricultural land in proximity to the local drainage systems undoubtedly contributes to the stream nutrient loads.

2.7.1.1.4 Stream System Channel Modifications -- Lower Swift Creek has a deep vertical-walled narrow channel cut into limerock. The stream slope is steep and current velocity is sufficient to keep the stream bed relatively free of rubble or sandy substrate. Therefore, existence of a diverse benthic community is hindered on most of the stream bottom in this lower portion (Figure 2.7-3).

The next upstream zone has a deep but wider channel with earth banks, slower flow and a substrate which ranges from rubble to sand with silt. No channel modifications have been made in this section and the base flow with the Occidental discharge increment is contained well within the channel.

The channelized zone begins above the facility and continues into Swift Creek swamp. The juncture of this and the lower zone has near bank-full flow, a silty bottom, and a saturated floodplain with stressed or dead hardwoods. A conversion to marsh vegetation is occurring in the area. The mid-portion of the zone is relatively deep with a silty bottom and slow moving water. Channelization has resulted in opening of the canopy and exposure of the water to sunlight. As a result, dense hyacinth mats appear in the widened channel but are generally limited to this section by log jams and debris accumulations in the lower portion of the zone. The portion of the zone above the mouth of Altmans

Bay Canal is narrower and faster-flowing due to the discharge from Swift Creek swamp and mine pit water; it is sunlit but not plankton dominated like the Altmans Bay Canal discharge.

The extreme upper Swift Creek zone has also been channelized. Prechannelization aerial photography indicates that formerly the natural channel was poorly defined within this zone with branching narrow vegetation strands serving as drainage conduits from several areas.

The Suwannee River Mine and Chemical Complex as well as mining in the Swift Creek vicinity provide a major and consistent flow component to Swift Creek which probably exceeds the pre-Occidental condition significantly. The expected bedload movement and scour do not seem to be the problem which would be anticipated in a channel adjusting to a flow increase. The silt accumulation area at the lower end of the channelized segment (Figure 2.7-2) may be the sole remaining indication of bedload movement after approximately 13 years of elevated discharge conditions.

2.7.1.1.5 Ongoing Mining and Reclamation -- Phosphate mining and reclamation are ongoing in the vicinity of the Swift Creek Chemical Complex. Approximately 3,400 acres in the area of concern have been mined or used for mine waste disposal since operations began in 1965. Drainage of all mined land in the Hamilton County area is routed primarily through Swift and Hunter Creeks. Surface mining is a highly intensive land use which affects both the biota and physical setting of the mine site, the local water table, and the water quantity and quality of local drainages.

Mining results in the removal of existing vegetation and animal life; changes the topography to a rolling system of land, lakes, and diked retention ponds; alters the soil composition, stratification and permeability; and produces a new water table in response to the topographic and soil alterations. The composition of the reestablished vegetation community (Sections 2.7.3.1.7 to 2.7.3.1.10) is a function of these physical changes, but is also a function of local seed sources, seed distribution patterns, and land use planning.

Mining generally increases the quantity and reduces fluctuations in the stream flow of local drainages by regulating water release and retention. Water released from a mining area is composed of surface and subsurface run-off and ground water pumpage from the surficial and Floridan aquifers which may be added to the water circulation system. Much of the present Swift Creek discharge is derived from these sources.

The water quality of streams can be affected by suspended and dissolved materials contributed by mine area discharge. Streams that drain mining areas generally contain higher concentrations of phosphorus, sulfate, fluoride, total dissolved solids and suspended sediment, and have a higher pH than streams draining unmined areas. The present water quality of Swift Creek reflects the influence of mining within its basin.

2.7.1.2 Physical Components of Natural Systems

In the absence of direct cultural modifications, the composition and distribution of native communities in an area are determined by the local physical setting. Those physical components which exert the greatest influence on biotic structure are topography, rainfall patterns, and soils.

2.7.1.2.1 Topography -- Elevations within five miles of the proposed SCCC range from a high of about 130 feet above mean sea level (MSL) to about 30 feet above MSL near the edge of the Suwannee River. The area is nearly level except along the river where the land grades to the river proper. North of the river, the land grades very gently downward toward Swift Creek, rising again on its eastern side creating the wide, shallow Swift Creek basin.

Topography influences community composition and distribution through its influence on drainage (Figure 2.7-2). The lack of relief throughout most of the area results in poor drainage and a high, perched water table which fluctuates widely in response to seasonal rainfall. In isolated shallow depressions, the water table may rise and remain above the soil surface for prolonged periods during the wet seasons, creating conditions favorable to the establishment of water-tolerant forested wetlands.

The surrounding flat uplands vary between extremes of surface soil dehydration and saturation in response to the water table fluctuations. The occurrence of the high water table during the summer growing season makes many of these areas unsuitable for cropland and they are generally left in forest. Periodic drying of the soil, while the water table is recessed, makes these areas susceptible to burning, which plays a primary role in determining upland forest succession (Section 2.7.3.1.1).

Well-drained areas with relatively stable moisture regimes occur in the vicinity of the Suwannee River. These areas support either a relatively xerophytic (dry) forest type, a mesophytic (moderately moist) forest type, or have been converted to agricultural use. A similar setting exists in the lower portion of most local Suwannee River tributary basins, including the lower portion of the Swift Creek watershed, much of which is currently in agricultural use.

2.7.1.2.2 Rainfall -- Rainfall in Hamilton County averages between 51 and 52 inches yearly, about half of which falls during the summer season between June and September. Droughts are likely to occur in the fall and occasionally in the spring (Boughey, et al., 1978).

Within a given region, rainfall patterns exhibit little local variation. Rather, it is the temporal variation in rainfall which exerts a controlling influence on local community structure and composition. The relationship between terrestrial plant communities, topography, seasonal rainfall and water table variations has been discussed (Section 2.7.1.2.1). The following discussion presents the influence of rainfall on local aquatic systems (i.e., the Suwannee River and Swift Creek).

The flow characteristics of streams and rivers are obviously related to rainfall patterns, though the relative flow response is also a function of drainage basin size, topography, and land use. For example, river systems like the Suwannee which drain a large land area are less influenced by short-term (e.g., day to day) variations in rainfall; the most significant variations in flow are seasonal. On the other hand, small stream systems often exhibit significant variation in relative flow on a weekly or even daily basis.

The volume and intensity of flow plays a large role in determining the extent of aquatic habitat and the characteristics of its animal life. Rivers and large perennial streams have a more stable environment than small or intermittent streams and support more stable aquatic communities. Therefore, in an indirect way, temporal variation in rainfall plays an influential role on aquatic community stability, and the degree of this influence is inversely related to the size of the drainage system.

2.7.1.2.3 Soils -- Soil structure and composition is determined by a variety of factors which include the type of parent material, topography, and drainage. Local soils were formed from marine sediments, which, through subsurface transport of soluble minerals and organics and prevailing soil moisture conditions, resulted in the existing distribution of soil types (Figure 2.7-4).

Soil nutrient and moisture characteristics directly determine plant community structure. Upland soils in the plant site vicinity consist of highly permeable, but somewhat sterile, sands. Nutrients are readily leached from the surface and accumulate around the level of the mean water table forming a dark-stained stratum or hardpan. The fertility of the upper soil horizons is therefore dependent upon water table depth. This may be reflected at the community level by decreased plant diversity and density in areas where the water table is excessively deep or the soils are well-drained.

Nutrients tend to accumulate in isolated depressions, where the soil surface is at or below the mean water table. These areas are often referred to as "nutrient sinks." They are inundated for too long to allow upland community establishment, and are occupied by water tolerant communities (swamps or marshes).

2.7.2 AQUATIC COMMUNITIES OF THE AREA

2.7.2.1 The Suwannee and Its Tributaries

The physical characteristics of the Suwannee River change considerably from its upper (above Branford) to its lower portions, and comprise the basis for dividing the river into two distinct subsystems (Figure 2.7-5).

Above the Florida state line, the acidic waters (pH ≈4.5) from the Okefenokee Swamp flow between low-lying banks over a bed of white phosphatic sand; but, as the river reaches into north Florida, its acid waters begin to cut into underlying limestone forming steep banks and frequent shoals. Solution of the limestone riverbed and mixing of river water with that of numerous springs in the area raises the pH of the water to slightly alkaline conditions (pH ≈7.0), usually before the river reaches Branford. However, the entire chemical environment in this upper portion of the river is strongly influenced by flow volume which is prone to abrupt seasonal change. Consequently, the environment in this portion is characteristically unstable (Cox, 1969; Bass and Hitt, 1971).

From just north of Branford to the Gulf of Mexico, the river is distinctly different from the more narrow, deeply incised, and fast flowing upper subsystem. In this lower portion, the river is characteristicly coastal in nature, having a broad flat channel and slower flow rate. Environmental fluctuations are much more subdued.

The three major tributaries entering into the Suwannee, the Alapaha, Withlacoochee and Santa Fe Rivers, are all downstream of the study area. In the eastern portion of Hamilton County near the area of present and planned phosphate mining operations, the land is drained by a variety of streams, the largest of which are Rocky Creek, Hunter Creek, Roaring Creek, and Swift Creek. Hunter and Swift Creeks presently drain the mining areas and their flow and chemical characteristics have been affected (Section 2.7.1.1.5). Swift Creek also receives all effluent from the existing chemical complex and is being considered as the receiving body for any discharge from the planned expansion.

2.7.2.2 Faunal Aspects

Studies concerning the invertebrate populations of the Upper Suwannee River (Cox, 1969, 1970; Bass, 1971; Holder, Wyatt and Hill, 1970) indicate a relatively low productivity attributable to natural environmental limitations. Shoal areas provide the most productive invertebrate habitats, with the torrential fauna having characteristics similar to fast mountain streams. Between the shoals, however, fine, sandy substrates predominate and the productivity is quite low. The deeper, mid-river zones are especially unproductive. The introduced Asiatic clam, *Corbicula manilensis*, dominates the invertebrate fauna in the lower portions of the river, but, as of 1970, had not increased its upstream range into the study area. There is a gradual increase in benthic populations with increasing distance downstream which is probably related to an increasing pH level as the waters move from the Okefenokee through the limestone river bed. A list of expected and observed invertebrates for the Upper Suwannee River and its major tributaries is provided by Cox (1969).

Seventy-one species of fish have been recorded from the Suwannee River system (Table 2.7-1), some of which spend at least a portion of their life in salt water. Two of these, the Atlantic sturgeon (*Acipenser oxyrhynchus*) and the Alabama shad (*Alosa alabamae*), are anadromous (i.e., live in salt water but breed in fresh water). Others regularly spend part of their life in fresh water, but return to salt water to spawn. Few of these species regularly travel up the Suwannee River as far as the study area. However, the Hog choaker and the American eel are found in the study area.

Certain permanent freshwater species such as the Suwannee bass (*Micropterus notius*) are restricted to the lower half of the drainage and do not regularly occur above the mouth of the Withlacoochee and Alapaha Rivers. Conversely, three species, the Ohoopee shiner (*Notropis leedsi*) and Weed shiner (*Notropis texanus*), are restricted to the upper half of the system. Of the 71 species occurring in the Suwannee system, at least 50 occur more or less regularly in the Hamilton County area (Carter Gilbert, Florida State Museum, personal communication).

Game fish surveys of the Suwannee River (Cox, 1969; Bass, 1971) indicate a qualitatively good sport fishery though fishing success is dependent on water level. Catch per unit effort is greatest during low water and comprises mostly Redbreast sunfish (*Lepomis auritus*). Catfish predominate in the catch during periods of high water. The abundance of fish tends to increase downstream. The fishery is primarily utilized by local residents and generally of low intensity.

2.7.3 TERRESTRIAL COMMUNITIES WITHIN FIVE MILES OF THE PROPOSED SWIFT CREEK CHEMICAL COMPLEX

2.7.3.1 Vegetation Components

Of the seven native forest communities characterizing north-central Florida (Monk, 1968), five are significantly represented within five miles of the project area. These include: 1) pine flatwoods, 2) Southern mixed hardwoods, 3) cypress swamps, 4) bayheads, and 5) mixed hardwood swamps. Another pineland community, the sandhills, is found within the area but its acreage is so low and its boundaries so gradual that consideration of the community type independently of other pineland types is unwarranted (Figure 2.7-6). Non native plant communities within the area include: 1) agricultural lands, 2) clay settling areas, 3) sand tailings areas, 4) reclaimed mined areas, and 5) unreclaimed mined areas. Acreage determinations of each community are shown in Table 2.7-2.

2.7.3.1.1 Pinelands -- Pinelands include pine flatwoods, pine plantations, and a limited sandhills area. The pine flatwoods and pine plantations are the most abundant vegetation type in Florida and in the project vicinity (21,610 acres, 43 percent of total area). Sandhills areas are localized and sparse to the extent that accurate mapping could not be performed at the aerial photography scale (1:40,000) from which the vegetation map was prepared.

There are few flatwoods and plantation sites within the area which are not under intensive management by either Continental Can (Jasper, Florida) or Owens-Illinois (White Springs, Florida). Management activities may include a 25-year rotation period consisting of clear-cutting followed by site preparation and planting, selective thinning, and periodic burning or culling to remove competing and unhealthy trees.

Since the composition and density of vegetation within each stand is not only determined by local soil characteristics, but is also directly related to age and management intensity, the community exhibits considerable local variation. The vegetation compostion ranges from that of recently cleared "old-fields", to flatlands with a variable pine-dominated tree cover, to dense pine tree monocultures. The dominant tree species is slash pine, although longleaf pine occasionally dominates drier sites. Commonly encountered woody understory species include saw palmetto, gallberry, wax myrtle, huckleberry and several species of Vaccinium. Ground cover species are wire grass, broom sedge, several ferns, and a variety of forbs.

Pine flatwoods and pine plantations are sub-climaxes which require periodic burning or management intervention to retard the establishment and growth of hardwoods. In the absence of fire and management succession is towards Southern mixed hardwoods (Monk, 1968).

Sandhills are open, pine-hardwood communities that occupy well-drained, sandy sites subject to rapid percolation of rain water and high evaporation rates. The topography is generally undulating to gently sloping. Such sites are largely confined to the southwestern portion of the study area in well-drained locations near the Suwannee River.

The sandhill community is dominated by longleaf pine and turkey oak with occasional bluejack oaks, sand post-oaks, and southern red oaks. In most areas the importance of longleaf pine has been lessened by logging. Immature overstory species compose the majority of the woody understory; however, this statum is usually sparse. The ground stratum is dominated by wire grass, runner oaks, and occasionally sassafras.

Like all native pinelands in the region, the sandhill community is a fire maintained sub-climax. In the absence of fire, succession proceeds toward the xeric phase of the Southern mixed hardwood community (Monk, 1968).

2.7.3.1.2 Southern Mixed Hardwoods -- Southern mixed hardwoods are a highly variable hardwood-dominated upland community type found where limestone and phosphatic deposits outcrop or in less fertile areas where fire has been suppressed long enough for hardwoods to assume dominance over pines (Monk, 1965). These areas are found predominantly along the Suwannee River and the lower portions of its tributaries (3,015 acres, 6 percent of the total area). Southern mixed hardwoods are commonly referred to as "hammocks" and are further distinguished into hydric (wet), mesic (moderate), and xeric (dry) hammock types on the basis of soil moisture.

The Southern mixed hardwoods community has the highest plant diversity found in the state. Monk (1965) reported finding a minimum of 71 important tree species. Typical overstory species include: southern magnolia, live oak, laurel oak, water oak, red maple, Florida maple, Florida elm, hickory, river birch, slash pine, loblolly pine, and spruce pine. The understory includes wax myrtle, American holly, dahoon, American hornbean, dogwood, several Hawthorn species and a variety of flowering shrubs. Generally, the mesic and hydric sites are dominated by a greater proportion of deciduous species, while drier sites are dominated by evergreens. Generally, the density of trees increases from dry to mesic sites and slightly decreases from mesic to wet sites (Monk, 1965).

The Southern mixed hardwoods community is the climax of upland community succession (Monk, 1968). Their development is initiated whenever pine dominated communities are protected from periodic burning, or when swamp communities are drained or filled.

2.7.3.1.3 Bayheads -- Bayheads are a forested wetland community occupying isolated depressions and headwater sites within the project area (3,015 acres 6 percent of the total area). The substrate is peaty, highly acidic, relatively unproductive, and seasonally flooded .

Vegetation within bayheads is dominated by broad-leaved evergreens. Typical dominants include sweet bay, swamp bay and loblolly bay. Sweetgum, cypress, red maple, loblolly bay, slash pine, and black gum are typical subdominants. Areas that are flooded for a longer period of time usually contain a higher percentage of cypress and black gum. Fetterbush is the most prevalent shrub and often forms dense thickets, although Virginia willow and buttonbush are also abundant. Sphagnum and several ferns compose the majority of the ground stratum.

Bayheads are the climax stage of succession in peaty, seasonally flooded areas. With improved drainage these areas may gradually be transformed into the hydric phase of a southern mixed hardwood community (Monk, 1968).

2.7.3.1.4 Mixed Hardwood Swamps -- Mixed hardwood swamps occupy a variety of low-lying, seasonally flooded sites. Surface soils are moderately acidic and high in organic matter and nutrients. Within the project area they occur most often as isolated interior depressions and along headwater areas of tributaries to the Suwannee River. Mixed hardwood swamps account for approximately 7,036 acres (14 percent of the total area) in the project area.

Broad-leaved deciduous trees dominate the community. Commonly encountered species include black gum, cypress, pop ash, red maple, sweet gum, and water oak. Laurel oak, Florida elm, dahoon, swamp bay, wax myrtle, button bush and American hornbeam are important subdominants. The ground cover is sparse and composed primarily of seedlings, ferns, lizards tail, and isolated pockets of Sphagnum.

Mixed hardwood swamps are a climax stage in forested wetland plant succession. However, induced drainage improvements can bring about a transformation into a moist Southern mixed hardwood community (Monk, 1968).

2.7.3.1.5 Cypress Heads -- Cypress swamps occur within the area as isolated communities occupying headwater areas and flatwoods surface depressions (6,031 acres, 12 percent of total). The small isolated stands typical of this area are referred to as cypress heads or domes. Soils underlying cypress heads consist of acidic, organic peat and muck. These depressions are seasonally flooded by rainfall and subsurface lateral seepage, and contribute to the drainage of surrounding pine flatwoods. Water loss occurs primarily through evapotranspiration, though slow lateral drainage to tributaries occurs during periods of heavy precipitation and runoff.

The dominant and often exclusive overstory species is pond cypress, though species such as red maple, black gum, swamp bay, loblolly bay, and slash pine become more common at drier sites or along the community edge. Important woody understory species include fetterbush, titi, and wax myrtle. Herbaceous ground cover includes Sphagnum and several species of ferns.

Cypress heads are a subclimax community which gradually succeed into bayhead or mixed hardwood swamp as the organic substrate accumulates and seasonal inundation becomes less prolonged. Many of the cypress heads within the managed pineland areas have been channelized and lumbered.

2.7.3.1.6 Agricultural Lands -- Agricultural farming lands within the project area comprise about 6,031 acres (12 percent of the area) and are located predominantly in the southerly and westerly portions near the Suwannee River. Crops produced on active farmlands vary from year to year (Section 2.7.1.1.3).

2.7.3.1.7 Mined Lands -- Vegetation surveys conducted in 10 (approximately) and 4 year-old unreclaimed mine areas indicate that most species establishing on the overburden piles are similar to those of fellow agricultural fields. However, the hills are prone to erosion and the establishment and coverage by many species is retarded to some extent. Within the oldest area the following species were dominant: 1) *Andropogon* sp., 2) *Cassia* sp., 3) *Panicum* sp., and *Eupatorium capillifolium*. Other species observed were *Crotolaria* sp., *Erigeron* sp., *Agalinis* sp., *Phytolacca americana*, *Baccharis halimifolia*, and *Rubus* sp. Within the more recently mined area, *Digitaria* sp. was the most abundant plant. Other species observed were *Polygonum* sp., *Phytolacca*, *Cynodon dactylon*, *Sonchus asper*, *Eupatorium*, and several other unidentified *Asteraceae* sp.

Succession on overburden piles resembles old-field succession. Pioneer and ephemeral-adventive species become sporadically established during the first several years. Later, perennial grasses and herbaceous broad-leaved plants become established and form the dominant plant cover. Woody shrubs and small tree saplings typically become established during the later portion of the perennial grass and herb stage. Potentially, the overburden piles in north central Florida may support live oak hammock communities as they do in the central Florida phosphate district;

however, there are no mined sites old enough to determine climax plant community composition on the Occidental holdings.

2.7.3.1.8 Settling Areas -- Surveys within active and relatively young but inactive (dewatered) settling areas indicate that colonizing vegetation is dominated by a few species that tend to form dense, continuous stands. Species encountered were water hyacinth, *Ludwigia* sp., cattail, and willow. Species encountered at the interface of the clays and retaining dike system were blackberry, groundsel-tree, broomsedge, and a variety of other forbs and grasses.

Succession in clay settling areas typically occurs in the following sequence. During the initial filling process colloidal materials settle to the bottom leaving a layer of water of varying depth. These areas are essentially shallow open water systems although, if established, water hyacinth forms extensive floating mats. As dewatering progresses, cattail and *Ludwigia* become established forming dense pure or mixed stands. As dewatering nears completion, willow typically becomes established and outcompetes the cattail and *Ludwigia*. Many dewatered settling areas lack standing water except during rainy periods and are occupied by dense willow stands of uniform height (10-14 ft.).

2.7.3.1.9 Tailings Areas -- Vegetation surveys were conducted in two unreclaimed tailings areas, aged 4 and 11 years, and another in a dike constructed with sand tailings. Natural revegetation of the 4 year old area has been minimal. Percent coverage, as determined by a line transect, was less than one percent and consisted of small isolated clumps of grasses and isolated broad-leaved herbaceous plants. Observed species were Cyperus sp., Ctenium sp., Arenaria sp., and Eupatorium sp. Percent coverage was approximately 30 percent in the 11 year old area with Heterotheca subaxillaris, Diodia teres, and Conyza parvas as the most abundant plants. Other species included Eupatorium capillifolium, Andropogon sp. and an unidentified grass. Several live oak saplings were also observed within this tailings area. Percent coverage of the tailings dike was approximately 20 percent and consisted of relatively evenly spaced individuals. Heterotheca subaxillaris, Diodia teres, and Andropogon were the most abundant plants in order of importance.

Succession on tailings occurs at a much slower rate than other soils because of the xeric nature of the substrate (Oosting, 1956). Plants initially establishing on tailings must have windblown seed disperal mechanisms and be able to survive the low water and nutrient conditions. Given enough time and protection from disturbance, tailings areas have the potential to support predominantly evergreen hardwood communities (scrub hammock) composed of Quercus virginiana, Q. myrtifolia, and Q. champmanii (Laessle, 1958). However, succession on tailings within the project area has not as yet passed the early pioneer stage.

2.7.3.1.10 Reclaimed Areas -- Revegetation is required to reduce the erosion potential of reclaimed upland areas. The current practice is to plant a combination of soil binding species after final grading. Generally, summer millet, winter rye, and permanent cover crops of bermuda and bahia are planted together. These areas are then fertilized with the equivalent of 500-600 lbs/acre of commercial 10-10-10 fertilizer. Annual burning and mowing regimes are used to maintain the area in permanent pasture. In some areas, trees have been planted for landscape or utilitarian purposes.

2.7.3.2 Faunal Components

2.7.3.2.1 Mammals - Characteristic Community Composition Within Various Terrestrial Systems -- Fifty-one species of mammals potentially occur within the study area (Table 2.7-3). These include species whose geographic ranges come in close proximity to the study area but which are not necessarily sympatric with it. The rationale for including these species (most notably the Florida mouse, Manatee and Nutria) is the availability of preferred or suitable habitat in the study area which could potentially be used. Nevertheless, such species were not encountered.

Of the 51 potential species, 33 (65 percent) have been confirmed as being within the five-mile study area by field observation, museum specimens (Florida State Museum) or the literature. Twelve species (24 percent) are either legally protected by state and/or federal agencies (USDI, 1973; Florida Game and Fresh Water Fish Commission [FGFWFC], 1977) or listed (without benefit of legal protection) by the Florida Committee on Rare and Endangered Plants and Animals (Layne, 1976a), Southeastern Section of the Wildlife Society (Hillestad, Means, and Baker, in press) and the Georgia Endangered Species Committee (McCollum, 1974). These 12 species are discussed in more detail in Section 2.7.5.2.

The species list (Table 2.7-3) was generated from field observations supplemented with the literature (Jennings, 1958; Hall and Kelson, 1959; Barbour and Davis, 1969; Lowery, 1974; National Fish and Wildlife Laboratory [NFWL], 1978). Natural vegetation associations and agricultural lands can be characterized by certain species of mammals that generally occur in these habitats (FGFWFC, 1976). The occurrence of other mammals on the vegetative associations is usually a function of the physical characteristics of the particular habitat type. These include density of tree coverage, canopy height, ground cover density, soil conditions, etc. Relative abundance of a particular species depends upon the physical characteristics of the habitat community as well as availability of food resources, nesting sites, and other ecological requirements unique to a particular species. Each vegetative community is briefly discussed in terms of its characteristic mammals.

The pine flatwoods habitat includes longleaf pine flatwoods, slash pine flatwoods, clear cuts and planted pine plantations. The characteristic mammals of both flatwoods types is the Hispid cotton rat. The presence of other mammal species in the flatwoods is generally dictated by the physical characteristics of a particular stand, such as substrate conditions in the case of burrowing or burrow-dwelling species. Generally, species composition is basically the same in both types of flatwoods with the main difference being in relative abundance. There are no characteristic mammals of clear cuts or pine plantations. Clear cutting a stand initially removes all mammalian species with colonization soon taking place by rodent generalists such as the Hispid cotton rat.

The Hispid cotton rat is the most abundant species in the pine plantation but does not necessarily characterize this vegetative community. Other mammals that may be found in this habitat type are generally similar to those found in the two flatwoods type.

The high pinelands-sandhill community is sometimes classified into several phases. However, the physical structure and appearance of these phases is basically the same: open tree stands, clumps of scrubby vegetation, and well drained sandy soils. This set of characteristics creates habitat edge within the vegetational unit and subsequently, an increase is seen in species diversity (FGFWFC, 1976). Typical mammals of this habitat type include the Gray fox, Sherman's fox squirrel, Southeastern pocket gopher, Old field mouse, Florida mouse, Hispid cotton rat, Yellow bat, Evening bat, and Least shrew. The Gray fox and Sherman's fox squirrel may reach extremes in their population densities in this habitat type. Evening bats and Yellow bats may be present during the winter and the Southeastern myotis and Eastern pipistrel may roost in available caves in this vegetation association.

Based upon substrate conditions, the Southern mixed hardwoods can be catagorized into three types of hammocks: xeric, hydric, and mesic. The characteristic mammal of the three hammock types is the Eastern gray squirrel. Southern flying squirrels may also be characteristic of mesic and hydric hammocks. This may also occur in xeric hammocks, but only occasionally. The presence of fossorial and sub-fossorial species is dictated by substrate conditions.

The Raccoon is characteristic of bayheads and mixed hardwood swamps. Other mammals that are usually characteristic of the mixed hardwoods include the Cotton mouse, Eastern woodrat, Southeastern myotis, Red bat, Seminole bat, and Evening bat. The latter two Chiropteran species are not present in this habitat during the winter months. The Cotton mouse and Eastern woodrat, as well as the Rice rat, are characteristic mammals of the cypress head vegetation association. Gray squirrels and Virginia oppossums are also commonly present in cypress heads.

Agricultural lands include farms, fields, pastures, and associated buildings. The Hispid cotton rat is the most abundant mammal as well as the characteristic species of fields. Murid rodents (House mouse, Norway rat, Black rat) are generally found in proximity to buildings associated with agricultural lands. The Southeastern myotis may roost in these structures also.

Several Chiropteran species are associated with aquatic areas. Seminole bats, Red bats, Evening bats, and the Southeastern myotis feed along rivers, spring runs, creeks, or reservoirs and lakes. The migratory Hoary bat feeds in these aquatic areas also. Mammals such as the Beaver, River otter, Southern mink, and Round-tailed muskrat may also occur in these aquatic areas.

Table 2.7-4 presents the expected mammalian species of the proposed five mile study area and their probability of occurrence on different phases of mined lands. Of the 51 species listed, 21 have been confirmed as on site (field observations; NFWL, 1978). Most notably missing from the mammalian fauna are Sciurids due to the lack of any substantial trees. Those species which are found to be most abundant are generalist rodent species, such as the Hispid cotton rat and Cotton mouse, and wide-ranging or cosmopolitan species such as the Raccoon and Virginia oppossum. Those species associated with aquatic or semiaquatic areas (River otter, Rice rat, Red bat, and Yellow bat) are also found in relatively moderate numbers.

The unreclaimed mined lands were areas of recent mining efforts. Topography was of a hill-valley nature with water in valley areas. Vegetation was in early stages of succession with grasses and small shrubs being the dominant forms. The Hispid cotton rat, Rice rat, and Cotton mouse are likely to be found here as well as the River otter, Raccoon and Virginia oppossum. Tracks of the Gray fox and Bobcat were also seen in these areas.

Active settling areas consist of open water bodies with dike roads and edges. The dike roads are mowed regularly. The Hispid cotton rat is probably the most abundant small mammal of this phase of mined lands. River otters may also be expected to occur in these areas. Chiropteran species which feed over lakes and reservoirs can also be reasonably expected to occur here. Abandoned or inactive settling areas are assumed to contain much of the same mammalian fauna. However, as the water dries up and vegetation invades the open water area, aquatic type species are replaced with more terrestrial types such as the Raccoon, Spotted skunk, and Eastern cottontail.

Pumped sand tailings piles are characterized by loose, sandy soil with little to no vegetation. Old field mice will presumably be the predominant rodent of the area. Substrate conditions are usually too loose for other burrowing species such as the Southeastern pocket gopher and mole. Raccoon, Opossum, Gray fox, and Bobcat may use such areas if escape cover is adequate.

Murid rodents such as the House mouse, Black rat, and Norway rat can reasonably be expected to occur in structures, debris, and landfill areas. Dike roads may serve as corridors of passage for many mammal species between settling areas and nearby natural communities.

Reclaimed lands in this area are "pasture" like in appearance. Hispid cotton rats can be expected to characterize this situation. Lakes associated with reclamation efforts may contain River otters and possibly support aquatic associated Chiropteran species. The general lack of escape cover precludes the existence of any sizeable populations of large mammals.

Generally, mined lands lack two components of the mammalian fauna. Species with arboreal tendencies, such as the Eastern gray squirrel, Southern flying squirrel and Sherman's fox squirrel rarely occur in these areas. Soil substrate changes and conditions make some mine areas impossible for burrowing and burrow-dwelling species. The initial lack of escape cover for species such as the White-tailed deer, Florida black bear, and other large mammals is responsible for the rare to non-existent occurrence of these species on the mine. However, as succession takes place, either on reclaimed lands or inactive settling areas, these large mammals and intermediate-sized ones, such as the Eastern cottontail, Gray fox and Bobcat, may show an increase in use of the area.

The proximity of these mine lands to natural communities provides an opportunity for species living in adjacent habitats to "wander" onto mined lands. Once there, these species may take up residence completely within the mined lands, provided all their respective ecological requirements are met. A mammal may also use the mine as part of its range if one of its ecological requirements is more available there. An example would be use of the mine as a food resource by the Bobcat and use of the natural communities for refugia. A third option the mammal species may take is to not utilize any portion of the mined lands at all. An obvious example is seen with Sciurid species.

The proximity of these mined lands to the natural community also provides an interface or ecotone similar to a flatwoods-clearcut or forested area and old field situation.

2.7.3.2.2 Birds - Characteristic Community Composition Within Various Terrestrial Systems -- Of the 235 species of birds expected to occur in the study area, 160 species have been identified by our field team and during past studies in the area (NFWL, 1978). Birds were recorded from six natural habitats and in 7 man-made habitats found in the study area (Table 2.7-5).

Thirty-five percent (82 species) of the 235 species of birds expected to utilize the study area occur in the pinelands. The pineland avifauna varies with the density of the vegetation found in the different associations that the term pinelands encompasses.

The species composition of the open clearcut is similar to the avifauna found associated with old farmlands. Wintering species that use the area include a variety of sparrows, Palm Warbler, House Wren, Marsh Hawk and American Kestrel. The breeding birds of the clearcuts include the Carolina Wren, Loggerhead Shrike, Rufous-sided Towhee, Bobwhite and Eastern Kingbird.

The pine flatwoods consist of a canopy of pine with palmetto, wax myrtle and Vacinnium as an understory. The resident Rufous-sided Towhee is abundant in the understory as in the Pine Warbler in the canopy. Other resident species include the Carolina Wren, Fish Crow, Brown-headed Nuthatch, Cardinal and the Red-bellied Woodpecker. In its prime fire controlled sub-climax condition, the pine flatwoods support such species as the Red-cockaded Woodpecker, Bachman's Sparrow and Eastern Wood Pewee. Fire control in the study area has eliminated this prime habitat and eliminated the Red-cockaded Woodpecker and greatly reduced the populations of other open pinelands species.

Of the expected 235 species in the study area, 29 percent (68 species) are known to utilize the sandhill communities. This community is characteristically an open longleaf pine-turkey oak forest with a scattered bushy undergrowth. The Yellow-rumped Warbler is the most abundant wintering species in this habitat. The House Wren, Hermit Thrush, Eastern Phoebe, American Robin and Ruby-crowned Kinglet also winter in the sandhills. Breeding birds expected to occur here include: the Pine Warbler, Cardinal, Carolina Wren, Tufted Titmouse, Carolina Chickadee, Rufous-sided Towhee and White-eyed Vireo.

Ninety species, or 38 percent of the total expected species are found in the southern mixed hardwoods. This area is comprised of large, evergreen and deciduous oaks with a thick, brushy undergrowth. Mixed flocks of passerine birds which were observed feeding in the canopy included: the Black and White Warbler, Tufted Titmouse, Blue-gray Gnatcatcher, Yellow-rumped Warbler, Yellow-throated Warbler, Ruby-crowned Kinglet and Solitary Vireo. Other birds encountered in the canopy and sub-canopy were the Pileated Woodpecker, Red-bellied Woodpecker, Eastern Phoebe, Blue Jar and American Goldfinch. Species utilizing the undergrowth included the Cardinal, Brown Thrasher, Hermit Thrush, Carolina Wren and

Ovenbird. Bayheads provide cover and feeding habitat for 44 species including resident birds such as the Rufous-sided Towhee, Mockingbird, Brown Thrasher and Carolina Wren. Wintering species commonly found in this habitat include: the Yellow-rumped Warbler, House Wren, Eastern Phoebe and American Robin. In wetter, more open sections of this habitat, native species, such as the Wood Duck, Green Heron and Little Blue Heron were found. In several nearby bayheads, similar to Bee Haven Bay, the Florida Sandhill Crane has been recorded as breeding (Williams and Phillips, 1972; Steve Adams, personal communication).

Mixed hardwood swamps are predominately found along the tributaries to the Suwannee River in association with cypress swamps and bayheads. Sixty species of birds are expected to utilize this habitat. The habitat edge between the mixed hardwood swamps and drier associations provide an edge that serves as cover and habitat for birds such as the Catbird, Carolina Wren, Cardinal, House Wren and Brown Thrasher.

The swamp itself provides roosts for Barred Owls, Red-shouldered Hawks, Anhingas, Wood Ducks, and Belted Kingfishers. Beavers occasionally flood these areas creating sites for heron rookeries.

The wetter areas of the swamp and creek border may provide feeding habitat for the Great Blue Heron, Green Heron, Water Thrushes and Spotted Sandpiper.

Because of their small size, cypress heads play an important ecological role by creating habitat edge in an otherwise continuous pine flatwoods setting. This edge is used for breeding by many of the pineland birds. The wetness of the ground often prevents the area from burning when fire sweeps through the neighboring flatwoods. Cavity nesters, such as the Red-bellied Woodpecker, Eastern Wood Pewee, Hairy Woodpecker, Eastern Bluebird, Tufted Titmouse, and Carolina Chickadee nest in dead snags and stumps found in the cypress heads, but are absent in frequently burned flatwoods. Wintering species, such as the American Robin, House Wren, Yellow-rumped Warbler, Gray Catbird, and Common Yellowthroat, find cover in the dense, shrubby edge of cypress heads and food in the damp ground of the interior. The Red-shouldered Hawk nests in cypress heads and ranges out over pine flatwoods.

Agricultural lands provide additional habitat in this naturally forested area for 68 species of birds. These altered habitats support populations of birds that would not otherwise occur in the area. Invader species, such as the Cattle Egret and Brown-headed Cowbird, as well as the introduced Starling and Rock Dove, were found in these areas. Other species that were found to benefit from open lands were the Killdeer, Eastern Meadowlark, Eastern Bluebird, Loggerhead Shrike, and Red-tailed Hawk. Wintering species, such as the Song-Sparrow, Swamp Sparrow, Field Sparrow, White-throated Sparrow, Chipping Sparrow, Red-winged Blackbird, Water Pipit, American Kestrel and Marsh Hawk, were also found to utilize the various habitats of the agricultural lands.

Phosphate mining creates habitat new to the study area and attracts 70 new species (30 percent of the expected total) to the area. The avifauna of the mined areas is composed of birds found associated with fields, hedgerows and wetlands.

Open water species observed in the mine cuts at the Suwannee River Mine and Swift Creek Mine included three species of duck, two species of grebe, one species of gull and one tern. Of these, the Common Goldeneye and Horned Grebe, which were observed at the Swift Creek Mine, are noteworthy because they do not frequently visit inland waters. Shorebirds encountered included five species of herons, three species of sandpiper, the Kingfisher, and the boat-tailed Grackle. Land birds observed on overburden included four species of hawks, two species of vultures and twelve species of songbirds. All the birds observed were in low numbers, with the exception of the Turkey Vulture, which roosted on overburden mounds at the Swift Creek Mine. The American Robin was plentiful at the Suwannee River Mine where it fed on water hyacinths covering the open water areas. After the vulture, the most common bird was the Red-winged Blackbird. It was found in large flocks feeding on accumulated seeds. A total of 132 species of birds are expected to use this area though many would occur in small numbers due to the barren nature of the landscape.

The settling area is comprised of large open bodies of water, cattail areas, primrose willow marsh thickets, and willow thickets. The active areas have a constant flow of nutrient enriched water passing through them creating abundant food for 128 species of waterfowl, herons and other water-associated birds. The inactive areas contain mainly marsh and willow thickets. The active areas have a constant flow of nutrient enriched water passing through them, creating abundant food for 128 species of waterfowl, herons and other water-associated birds. The inactive areas contain mainly marsh vegetation with fluctuating open water areas. These areas attract 137 species of birds including dabbling ducks, bitterns, rails, coots and gallinules, and, when mud flats are exposed, a large number of sandpipers. In the summer of 1977, a large rookery of herons and ibis existed in Active Settling Area Number 8. The Florida Game and Fresh Water Fish Commission estimated the number of birds using the rookery in the spring of 1977 to be as follows:

Double-crested Cormorant	250 pairs
Anhinga	150 pairs
Great Egret	150 pairs
Cattle Egret	4500-5000 pairs
Snowy Egret	50 pairs
Little Blue Heron	200 pairs
Black-crowned Night Heron	75 pairs
White Ibis	2500 pairs
Green Heron	12 pairs

In addition, many of the inactive areas serve as winter roosts for these species.

Tailings areas are virtually sand dunes with little vegetation. The species that have been observed in these areas are the Savannah Sparrow, Red-winged Blackbird and Killdeer. The areas are also used by raptors, such as the Red-tailed Hawk, Marsh Hawk, Kestrel and Turkey Vulture with the total expected in these areas to be 16 species. The higher sandhills are used as day roosts and observation points of these raptors.

The grasslands of the reclaimed areas were found to provide habitat for many birds: the Bobwhite, many species of sparrows and raptors, Palm Warbler, Red-winged Blackbird, Common Grackle, Meadowlark, and Killdeer. In wet grasslands, Snipe, Greater Yellowlegs, and Lesser Yellowlegs were observed. The ponds created by reclamation provide feeding habitat for a large number of water birds. Ducks, herons, anhingas, cormorants, terns, gulls, and coots were found to use these areas. One hundred and forty-seven species of birds are expected to use the reclaimed areas.

The thicketed islands in these ponds in the reclaimed areas serve as roosts for Night Herons and as nesting areas for Boat-tailed Grackles. Note-worthy migrants observed using this habitat were the Common Loon, White Pelican and Common Goldeneye.

2.7.3.2.3 Herpetiles; Characteristic Community Composition Within Various Terrestrial Systems -- A species list of the potential herpetofauna of the study area (Table 2.7-6) was generated from field observations and the literature (Bishop, 1947; Wright and Wright, 1949;

Carr, 1952; Wright and Wright, 1957; Ernst and Barbour, 1972; Conant, 1975; Stevenson, 1976d; NFWL, 1978; Florida State Museum, undated newsletter).

Potentially, 101 species of amphibians and reptiles may occur in the study area. Of these 49 (48.5 percent) have been confirmed as on-site. The reptilian component of the herpetofauna is significantly more diverse than the amphibian component (63 species of reptiles versus 38 species of amphibians). Characteristic herpetofauna species of each habitat type can be delineated based upon the ecological requirements of the particular species which is fulfilled by the specific habitat type (Florida Game and Fresh Water Fish Commission [FGFWFC], 1976; Steve Christman, NFWL, personal communication).

The characteristic herpetofauna of the high pinelands are generally species adapted to xeric environments and species (both amphibians and reptiles) that, during extremes in temperature, utilize the microhabitats offered by Gopher tortoise and Pocket gopher burrows. Characteristic species include the Eastern coachwhip, Pine snake, Short-tailed snake, Crowned snake, Florida gopher frog, Eastern glass lizard, and Scarlet king snake. Aquatic species will occur in ponds located within this habitat type.

Pine-palmetto flatwoods are categorized into three phases: longleaf pine flatwoods, slash pine flatwoods, and clear-cuts. There are no characteristic species of the clear-cut phase. The herpetofauna of clear-cuts is low in diversity and consists of generalist species or those with a wide range of ecological requirements. The slash pine and longleaf pine phase of flatwoods are basically the same in their herpetological components. Characteristic species usually include the Pine woods snake, Rough earth snake, Florida box turtle, Little grass frog, Southern and Ornate chorus frog, Oak toad, and Flatwoods salamander. Streams and shallow aquatic areas which are typically present in flatwoods offer habitat for such characteristic species as the Striped newt, Lesser siren and Eastern mud turtle. The flatwoods habitat type offers a variety of microhabitats which contribute to the large diversity of the herpetological fauna of this vegetation association.

The Southern mixed hardwood habitat has been categorized into three phases: xeric, mesic, and hydric. The categorization is a function of substrate conditions and subsequent floral differences. Herpetofaunal relationships among these three phases also change, although some similarity is retained. The Florida red-bellied snake and Eastern spadefoot toad are characteristic species of the xeric phase of Southern mixed hardwoods. The Rusty mud salamander is characteristic of streams which pass through this phase. Eastern tiger salamanders and Mole salamanders are present as adults, but larvae are aquatic. The Broad-headed skink is characteristic of both the mesic and hydric hammocks. The Eastern indigo snake is characteristic of hydric hammocks and the Slimy Eastern tiger and Mole salamanders are characteristic of the mesic phase.

Intensive herpetological investigations of mined areas are practically non-existent. Twenty-one species have been confirmed on the mined lands in Hamilton County and 33 species are suspected to occur. The mined lands offer habitat for those terrestrial species generally broad in their ecological requirements and semi-aquatic and aquatic species such as the American alligator, Florida cottonmouth and Florida cooter.

2.7.4 SWIFT CREEK WATERSHED

Swift Creek drains an area of approximately 37.6 square miles and discharges into the Suwannee River west of White Springs, Florida. A vegetation map of the watershed (Figure 2.7-7) shows that current land uses are predominately agriculture, pine production and phosphate mining. The upper portion of the watershed contains a large wetland system kown as Swift Creek Swamp.

The upper creek channel is a canal through Swift Creek Swamp. The stream gradient within this segment is low (Figure 2.7-8). The mid-stream region is characterized by a wide flood prone area and a natural stream channel. The lower region (below U.S. 41) has a deeply incised, natural channel. Limestone outcrops are numerous and several small tributaries and seeps enter the creek.

Vegetation in the upper Swift Creek watershed consists of pine flatwoods and plantations interspersed with numerous cypress heads, bayheads, and mixed hardwood swamps (Figure 2.7-7). However, ongoing phosphate mining activities in the upper creek region are changing the vegetation patterns of that area.

Southern mixed hardwoods are the most prevalent community bordering Swift Creek in the mid creek region. Both mesic and hydric phases are represented. Chronic flooding is evidenced throughout much of the area by an increased number of dead or stressed trees in low-lying areas adjacent to the stream channel (Figure 2.7-7). Pineland and agricultural areas surround the southern mixed hardwood community.

Southern mixed hardwoods also occupy streamside areas in the lower creek region. Mesic and xeric phases are represented and mature stands are common. Agricultural lands dominate outside of the Southern mixed hardwood community.

2.7.4.1 Aquatic Communities

2.7.4.1.1 Macrophytes -- Aquatic macrophytes are herbaceous annual and perennial plants which are either restricted to or are otherwise capable of growing in submerged or saturated areas. Woody species which grow in seasonally flooded soils are treated as terrestrial plants and discussed in Section 2.7.4.2. Aquatic macrophytes encountered during the present and an earlier survey (LaMoreaux and Breedlove, 1977) are listed together (Appendix A). The sampling stations were the same for both studies (Figure 2.7-8).

Upper Creek -- The mixed hardwood swamp, bayheads, and cypress heads, dominating the upper creek region have a closed canopy and low levels of illumination, resulting in the exclusion of most aquatic macrophytes.

The mixed hardwood swamp habitat is subject to seasonal flooding which may result in the usual absence of species that are typically ground-dwelling. Characteristic species include the Rat snake, Florida cottonmouth, Gray tree frog, Bronze frog and River frog.

Bayheads are usually characterized by the Indigo snake and Lesser siren. Their herpetofauna is similar to that of the mixed hardwood swamp.

Cypress heads usually occur within stands of flatwoods. The herpetofauna of the cypress dome is usually a mixture of aquatic, semi-aquatic, and flatwoods species. Characteristic species include the Rough earth snake, Eastern mud turtle, Little grass frog, Narrow-striped dwarf siren, Striped newt and Flatwoods, Slimy, Dwarf, and Southern dusty salamanders.

Agricultural areas usually contain tolerant species having broad, ecological requirements. There are no characteristic species associated with these areas; however, some species are particularly abundant such as the Black racer, Garter snake, and Southern toad.

Aquatic and semi-aquatic areas include rivers, spring runs, ponds, lakes, and reservoirs. Species usually associated with these areas include the majority of turtles, the American alligator, and water snakes. Anurans and some salamanders rely on these habitats either totally or for reproduction.

Notable exceptions are lizards tail and several fern species. Where trees have been cut back along the channelized areas of Swift Creek, aquatic macrophytes are more prevelant. Dominant species include duckweed, lizards tail, Panicum scrabriusculum, and an unidentified sedge (Table 2.7-7). Spikerush and water hyacinth are abundant below the discharge canal from the Suwannee River Complex. The water hyacinth originates from the circulating water system associated with the chemical complex.

Mid Creek -- Swift Creek receives more sunlight along the mid-creek region, primarily due to the dieback of trees (Section 2.7.4.2) from flooding. Higher light intensity and flooded soil presently favor the development of a marsh system, and aquatic macrophytes are abundant within this region. Dominant species encountered in the earlier study (LaMoreaux and Breedlove, 1977) were lizard's tail, marsh pennywort, Polygonum, Murdannia, and Cicuta (Table 2.7-7). The present study revealed water hyacinth, spike-rush and Panicum scabriusculum to be dominant within the stressed tree area. Water hyacinth, originating from the Suwannee River Mine occurs as large mats covering the stream in areas where snags and logs impede their movement downstream. They are not found below U.S. 41 even though numerous snags exist.

Lower Creek -- Aquatic macrophytes are rare to nonexistent in the lower creek region (Lamoreaux and Breedlove, 1977), though Sphagnum and royal fern were observed in scattered locations along the stream banks during the present survey. Several factors account for the relative lack of aquatic macrophytes. The deeply incised stream bed and strong current restricts the utilization of substrate available for macrophyte establishment. In addition, the mature Southern mixed hardwood stand and its closed canopy limits light penetration at the herbaceous level while its moderately dark water further restricts light penetration through the water column.

2.7.4.1.2 Periphyton -- Periphyton was sampled in Swift, Hunter, Rocky and Roaring Creeks, as well as Camp Branch (Figure 2.7-9). Identifications were made (Appendix B) to provide indices of water quality and periphyton community conditions and estimates of periphyton biomass were made (Tables 2.7-8 and 2.7-9).

The mean diversity for eight replicated Swift Creek stations was 2.85 (Table 2.7-9) which indicates a relatively good, diverse periphyton community and low pollution or stress conditions (EPA, 1973). The lowest diversity in Swift Creek occurred at SC-9 which is upstream of Altmans Bay Canal or SRM/SRCC discharge to Swift Creek. Nonprocess water discharged from Altmans Bay Lake, appears to be a good source of colonizer organisms for the samplers suspended in Swift Creek. The Altmans Bay Canal diversity (ABC-8), which carries the nonprocess water discharge, was 2.61, which again indicates a relatively diverse periphyton community structure. Seven of the eight stations (88 percent) sampled in Swift Creek had a higher diversity than the mean diversity of streams not influenced by mining (Rocky Creek, Roaring Creek, and Camps Branch) (Table 2.7-9).

Equitablity is often considered a more sensitive indicator than diversity (EPA, 1973). An equitability (e) greater than or equal to 0.5 indicates a nonstressed condition while an equitability of less than 0.5 indicates a stressed community. All stations on Swift Creek had an equitability index of about 0.5 or greater for periphyton (Table 2.7-9). The equitability index for the control streams was 0.5 which indicates that the Swift Creek periphyton community is in as good or better condition than nearby streams not influenced by mining. (Figure 2.7-10).

2.7.4.1.3 Macroinvertebrates -- Replicate macroinvertebrate samples were collected from natural and artificial substrates at sampling stations in Swift Creek, the Suwannee River and other local area streams. Hester Dendy samplers were used as artificial substrates to compensate for local differences in the bottom habitat and to accentuate effects due to water quality. Natural substrates were predominantly silt, sand, pebble, leaves, detritus and/or limestone.

Two sampling periods were conducted, the first during the fall (1977) and the second the following winter (1978). Qualitative and quantitative indices of macroinvertebrate community conditions were generated for both samplings and were used to compare biological conditions and water quality in the various area streams (Appendix C).

Camps Branch, Rocky Creek and Roaring Creek were considered unaffected by phosphate mining and thus indicative of natural streams in the area.

Beck's Biotic Index: Beck's Biotic Index (Beck, 1954, 1955) is a qualitative indicator of water quality based on the composition of the invertebrate community and the tolerance of species to different levels of organic pollution.

Generally, index values below 1 are indicative of gross pollution levels, while values between 1 and 6 may indicate moderate pollution. The index values for communities from clean, slow-moving streams usually range between 4 and 9, while communities from clean, fast-moving streams usually produce values of 10 or more.

No significant differences were detected in Beck's Biotic Index between the fall and winter samplings with the exception of one Swift Creek natural substrate collection (SC-4B) (Tables 2.7-10 and 2.7-11). Artificial substrate samplers at the same location were not statistically different (Tables 2.7-10 and 2.7-11). Thus, the difference in the natural sediment collections were probably due to substrate differences and not water quality changes. Water quality changes should also be evident at other stations.

The index ranged from a low of 3.7 at SC-2 to a high of 15.7 at SC-4B (Tables 2.7-10 and 2.7-11) for natural substrate collections. The mean of both sampling periods, 7.5, is well above the level generally thought indicative of pollution (Beck, 1954, 1955) (Figures 2.7-11 and 2.7-12). Artificial substrate values ranged from 4.0 to 10.3 with a mean of 7.3 for both sampling periods. No clear trends are evident except for a possible increase in the index downstream. This would be expected since the samplers have a better chance of collecting colonizer organisms downstream due to a greater volume of water flow past them.

Statistical means of Beck's Biotic Index for control streams were compared to means of the Swift Creek stations and no significant differences were detected ($P \leq 0.05$) (Table 2.7-12) which indicates that the aquatic communities in Swift Creek are unstressed due to influences from the Occidental operations.

Diversity: Diversity is a quantitative measure of community structure which considers both the richness of species and the distribution of individuals among the species. It is also a useful measure of environmental quality since induced stress affects community structure which in turn alters its diversity. Typically, diversity indices are higher for well established communities under minimal stress than for newly emerging communities or those in a fluctuating or stress environment.

Diversity ($\bar{d}$) was calculated for each replicate macroinvertebrate sample collected using the Shannon-Weaver function (EPA, 1973) which is particularly useful being reasonably independent of sample size (Odum, 1971).

Comparisons of sampling periods indicated significant differences ($P \leq 0.05$) between the fall and winter sampling periods for natural substrate collections at SC-2, SC-4A, SC-9 and CB-2 (Table 2.7-10). Differences were detected for artificial substrate sampling at RO-2 and HC-1 (Tables 2.7-11). Differences were not found for both natural substrate and artificial substrates at the same stations. Differences detected between the fall and winter sampling periods could be due to several factors: 1) innate variability of natural substrates (sediments) at a specific site; 2) seasonal differences, such as temperature and climatic conditions; 3) water level and velocity differences which makes sampling less efficient and colonization of artificial substrate samplers and natural substrates more difficult.

It is improbable that the differences are due to water quality changes since no significant changes were noted at other stations in the same stream. Stations adjacent to the Occidental outfall in Swift Creek were not different statistically ($P \leq 0.05$).

Generally, diversity ranged from 1.02 to 2.60 for artificial samplers in Swift Creek over the fall and winter sampling periods. The mean, 1.80 during these periods, indicates that Swift Creek could be under moderate stress (Figure 2.7-13); however, indices calculated from natural substrate collections averaged 2.05 which indicates light to moderate stress. The average Swift Creek values were compared with the means of control (i.e. nonphosphate influenced) streams and no significant differences ($P \leq 0.05$) could be detected. This tends to suggest that the lower diversity values may be due to natural conditions in the study area and not from Occidental mining and processing influences. Streams in the area are typically brown water streams which are characteristically heterotrophic and relatively less productive than streams which are autotrophic and do not have darkly stained, humic, swamp waters which limits light penetration and subsequently production.

Equitability: Equitability (e) represents that component of total community diversity due to the distribution of individuals among species. Equitability values generally range from 0 to 1.0 with higher values characterizing a more even distribution of individuals among species present in the sample. A value of 0.5 represents the break point between lower values representative of stress waters and higher values characteristic of unstressed streams (EPA, 1973).

Average station equitability values were calculated for all macroinvertebrate collections made during both the fall and winter sampling sessions (Tables 2.7-10 and 2.7-11).

Paired t-test indicated no significant differences between sampling periods for artificial substrate collections (Table 2.7-11). A difference was indicated, however, between sampling periods at SC-2 and HC-1 for natural substrate collections (Table 2.7-10). These differences are probably not indicative of water quality changes because artificial substrate collections were not different, and in the case of Swift Creek, no other stations were found to be different. The innate variability of the sediments probably accounts for most of the differences at these two stations.

Average equitability values from sediment collections along Swift Creek were 0.59 in the fall and 0.69 in the winter. Station e values from the artificial substrates averaged 0.72 in the fall and 1.06 in the winter. All artificial substrate collections from Swift Creek had equitability values above 0.58 for both sampling sessions. Station equitability values from natural substrate collections were below 0.5 at SC-2 (e = 0.36) and SC-7 (e = 0.27) during the fall and at SC-4 (e = 0.48) and SC-9 (e = 0.42) during the winter. These lower values probably indicate substrate limitations rather than water quality limitations since artificial substrate samplers at the same stations showed equitability values well above the 0.5 break point value for unstressed conditions.

Stations along the uninfluenced, natural streams averaged 0.75 and 0.86 for sediment samples from the fall and winter sessions and 0.96 and 1.0 for fall and winter samples from artificial substrates.

Only one significant difference ($P \leq 0.05$) was detected between Swift Creek and the natural streams used as controls (Table 2.7-12). The difference occurred between artificial substrate collections during the fall sampling. Even though a difference was detected, both means were well above the break point value between stressed and unstressed communities. In fact, all means indicated a relatively unstressed condition (Figures 2.7-13 and 2.7-14).

Biomass: Mean biomass estimates were calculated for each station based on the weights of replicate macroinvertebrate samples collected from stream sediments (Table 2.7-13, Figure 2.7-14) and from artificial substrates (Table 2.7-14, Figure 2.7-13) during the fall sampling session. Dry weight estimates for all Swift Creek stations averaged 1.75 g/m^2 for the sediment collections and 0.80 g/m^2 for the artificial substrates. Values tended to increase toward the centrally located stations though the highest observed biomass was from the sediment community at ABC-8 (8.74 g/m^2).

The dry weight biomass of sediment collections from the uninfluenced stream stations averaged 1.18 g/m^2 while the artificial substrates produced a mean station average of 0.24 g/m^2. The Hunter Creek station averaged 0.92 g/m^2 from sediment samples and 0.10 g/m^2 from the artificial substrates.

A one-way analysis of variance was used to compare the mean biomass from Swift Creek main channel stations with the mean of the various control stations. Although the artificial substrate biomass estimates from the Swift Creek stations (0.79 g/m^2) averaged higher than the control stations (0.17 g/m^2), the difference was not significant ($\alpha = 0.05$). Station biomass averages from the natural sediment collections were about the same for Swift Creek main channel stations (1.14 g/m^2) and the control stations (1.18 g/m^2).

Summary: Beck's Biotic Index, diversity indices and equitability indices all indicate that the macroinvertebrate communities in Swift Creek are not heavily stressed and that the water quality is relatively good. Community diversity indices and Beck's Biotic Index values for Swift Creek stations were not statistically different ($P \leq 0.05$) from other area streams not affected by phosphate mining. A statistical difference was found between the Swift Creek mean and the natural stream mean for artificial substrate collections during the fall, 1977 sampling. However, both means were well above the values indicative of stressed or polluted levels.

2.7.4.1.4 Fish -- Fish were sampled in November 1977, at five stations along Swift Creek (SC-1, SC-2, SC-4, SC-7, ABC-8 and SC-9) and for comparison at similar upsteam locations in Roaring Creek (RO-2), Camps Branch (CB-2), Hunter Creek (HC-1) and Rocky Creek (RC-2) (Figure 2.7-15. Results include a listing of encountered species and their habitat preferences (Table 2.7-15) and estimated average fish diversity and biomass per station (Figure 2.7-15 and Table 2.7-15).

A total of 25 species were collected, seven of which were found exclusively in Swift Creek, while 10 were found only in the control streams. Eight species were common to both types of systems. The total number of species collected represents a high percentage of the fish species of the area (Table 2.7-1). While this suggests that ecological conditions within Swift Creek are normal, this can only be accurately determined by analysis of qualitative and quantitative composition of fish collected in Swift Creek and by comparison with the collections from the control streams.

A list of fish species taken in Swift Creek is very similar to what might be expected to occur in the adjacent Suwannee River (particularly from Stations SC-1 to SC-7), as indicated by the presence of such strictly riverine species as *Notropis leedsi*, *Notropis venustus*, and *Notropis texanus*. *Notropis petersoni* and *Labidesthes sicculus* are also common in, though not necessarily exclusively confined to, this type of ecological situation. These species are not known to be particularly resistant to pollution and the abundance of these and other species, together with the overall species diversity, (Table 2.7-16) strongly suggests natural, healthy conditions. At Stations SC-8 and SC-9, species characteristic of smaller vegetated streams, such as *Heterandria formosa* and *Centrarchus macropterus*, were collected. Any species difference encountered at Station SC-9 (above the Altmans Bay or SRM/SRCC canal entrance) is believed attributable to the fact that SC-9 is a more upstream station and harbors fish characteristic of smaller water bodies.

The fish taken at the four control creeks were comprised of species characteristic of small, densely vegetated bodies of water, such as *Esox americanus*, *Aphredoderus sayanus*, *Leptolucania ommata*, *Enneacanthus gloriosus*, *Enneacanthus obesus*, and *Elassoma evergladei*. *Heterandria formosa* also is typical of such situations, but was only encountered in Swift Creek at Station SC-7. Conversely, *Percina nigrofasciata* was encountered in both Camps Branch and Swift Creek, although it is usually found in open, flowing water with little vegetation.

Biomass estimates and diversity indices for each sample station were generated to provide quantitative values for statistical comparison

(Tables 2.7-17 and 2.7-18). Stream flow at Station SC-1 was too high to allow reliable replicated sampling and this station was subsequently dropped from the data analysis. The mean biomass of fish collected in Swift Creek was 21.17 kg/ha ($s_{\bar{x}} = 22.4$) while the control streams averaged 1.99 kg/ha ($s_{\bar{x}} = 1.34$). These means were not significantly different ($\alpha = 0.05$) based on a one-way analysis of variance (Table 2.7-18). Analysis of variance between a representative Swift Creek location (SC-4) and the various control stations failed to detect any significant differences ($\alpha = 0.05$). A one-way analysis of variance between mean diversity values from Swift Creek (average $\bar{d} = 0.82$) and the control streams did indicate a significant difference ($\alpha = 0.5$), though this comparison included Swift Creek stations which were not representative of the physical setting sampled at the controls. Comparison of a representative Swift Creek station (SC-4) with three of the four control stations, which had a replicated diversity value (RO-2, CB-2, and HC-1), failed to show a significant difference (Table 2.7-23).

In summary, if Swift Creek had suffered environmental degradation as a result of present and past operations, one would expect 1) fewer species than the number collected and in smaller numbers, and 2) a greater occurrence of Gambusia affinis or other hardy species such as gar or bullheads. Apparently, the differences between the fish encountered in Swift Creek and the four adjacent streams are indicative of basic natural ecological differences and not deleterious environmental changes (Carter Gilbert, Florida State Museum, written communication).

2.7.4.2 Streamside Terrestrial Communities

Vegetation data from a comprehensive biological and hydrological study of the Swift Creek, Rocky Creek and Roaring Creek watersheds (LaMoreaux and Breedlove, 1977) is used to describe the community composition along Swift Creek. Station descriptions and sampling methods used at each of the eight stations along Swift Creek (Figures 2.7-7 and 2.7-8) are included here in summary form (Table 2.7-19). The percent cover and importance values for plant species encountered along Swift Creek were determined by line and point-quarter transects, respectively (Tables 2.7-20 and 2.7-21). Importance values, determined from point-quarter transects, were derived for the Southern mixed hardwood forest only (LaMoreaux and Breedlove, 1977).

2.7.4.2.1 Upper Creek -- Dominant overstory species within Swift Creek swamp (Stations 7 and 8) were red maple, sweet bay, bald cypress, and black gum (Table 2.7-20). Understory species of importance included overstory saplings and seedlings, groundsel-tree, sweet pepperbush, swamp dogwood, wax myrtle, fetterbush, and blackberry. Important herbaceous plants included sawgrass, soft rush, Ludwigia, lizards tail, and an unidentified herb. All of these species tolerate prolonged seasonal flooding.

2.7.4.2.2 Mid Creek -- A majority of the streamside terrestrial vegetation was stressed within the mid-creek zone. Most of the area adjacent to the creek was flood prone and probably existed as hydric hammock prior to the increased base flow.

The stressed area is approximately 3 miles long and averages 100-150 yards in width. Qualitative surveys of this area revealed that mature individuals of both water tolerant and intolerant vegetation have been killed or stressed in the recent past. Cypress, willow, and pop-ash have reestablished, but some of these individuals are now stressed (LaMoreaux and Breedlove, 1977). Transects were not conducted in this area.

Dominant overstory species in the non-stressed mid-creek region (Stations 4, 5, and 6) included the same species observed for the lower creek area (discussed below). Understory species included saw palmetto, *Vaccinium*, greenbrier, dogwood, titi and button bush. *Polygonum*, lizards tail and *Murdannia keisak* were the most abundant herbaceous plants.

2.7.4.2.3 Lower Creek -- Dominant and abundant overstory species for the lower creek segment (Stations 1, 2 and 3) were red maple, river birch, pop-ash, sweetgum, live oak, laurel oak, water oak, bald cypress and blackgum. Due to the deeply dissected stream channel, pop-ash, bald cypress and blackgum were localized within the streambed. Other species, such as persimmon, post oak, pignut hickory, and live oak, were located above the streambed. Addition species found within and above the streambed included river birch, pop-ash, laurel oak, water oak, and sweetgum.

In addition to immature overstory species, the abundant understory species were saw palmetto, greenbrier, titi, *Vaccinium* and muscadine. These species were generally located outside of the streambed.

2.7.4.3 Faunal Components

2.7.4.3.1 Mammals -- Habitats used for Section 2.7.3.2.1 were lumped into four categories for small mammal assessment by trap lines (Figure 2.7-16). These four habitats are high pinelands, pine-palmetto flatwoods, mixed hardwood systems, and swamp systems. A total of 720 trap-nights in all four habitat types (180 trap-nights per habitat) yielded 13 individuals of five species (Table 2.7-22). This represents an overall trap success (captures per 100 trap-nights) in the natural communities of 1.8. The most abundant small mammal, as revealed by trapping, was the Cotton mouse. This species accounted for 53.7 percent of the small mammals captured during the trapping scheme. The pine-palmetto flatwoods yielded the greatest number of individuals (5) and the greatest number of species (3).

Evidence of fossorial and/or burrowing species was noted in the high pinelands and some drier agricultural areas. Burrows of the old field mouse were seen in these areas, but the species was not caught on traplines. Southeastern pocket gopher mounds and Southeastern mole tunnels were seen in the high pinelands and several pine-palmetto flatwood areas. Mole tunnel systems (trails) were also seen in drier portions of the mixed hardwood systems.

Chiropteran species were observed at dusk foraging on Swift Creek near Water Quality Stations SC-2, SC-4, and SC-7. The only species confirmed were the Yellow bat and Red bat. These two species and the Evening bat, Hoary bat, and Big brown bat have been observed along the Suwannee River upstream and/or downstream from the confluence with Swift Creek (NFWL, 1978; Terry Zinn, Florida State Museum, personal communication). Low temperatures limited assessing the Chiropteran component of the mammalian fauna fully.

Arboreal species were seen in all natural community habitat types. The most conspicuous species was the Eastern gray squirrel. Southern flying squirrels were noted near Water Quality Station SC-6. Sherman's fox squirrel was not observed during fieldwork, although suitable habitat does exist along parts of the drainage basin.

Large and intermediate-sized mamals, assessed by tracks, sign, and/or direct observations, included the Raccoon, Virginia opossum, Nine-banded armadillo, Stripped skunk, Spotted skunk, Eastern cottontail, and Marsh rabbit. The Gray fox was seen in agricultural-wooded area edges. River otters were observed in the creek between Water Quality Stations SC-4 and SC-7. The American beaver is considered an inhabitant of Swift Creek and its drainage systems due to the occurrence of signs primarily at or near Water Quality Stations SC-2, SC-4, and SC-6.

Of the 51 species (Table 2.7-3) potentially present within the study area, 28 (55%) have been confirmed within the natural communities of the Swift Creek drainage (Table 2.7-23). Of the 33 species confirmed as present within the five-mile study area, 28 (85%) have also been confirmed within the natural communities of the drainage basin.

The Swift Creek and Suwannee River Mine Complex mined land phases were also assessed for their respective small mammal populations by traplines (Figure 2.7-17). Trapping of the Swift Creek mined land phases resulted in 23 individuals of five species for a total trap success of 3.2 (Table 2.7-24).

On the Suwannee River Mine Complex mined land phases, 47 individuals of five species were captured (Table 2.7-25). This results in a trap success of 8.7. The Hispid cotton rat and House mouse were the most abundant species of small mammal, as revealed by trapping, on the Swift Creek mined lands (30% and 40% respectively to total individuals captured) and on the Suwannee River mined lands (43% and 34%, respectively). The most notable component missing from the mammalian community (Table 2.7-23) on mined lands is the arboreal. This is due to lack of trees of any suitable acreage. Arboreal species present, in the natural community but not on mined lands, include the Eastern gray squirrel and Southern flying squirrel. The Least shrew and Short-tailed shrew were found in both mined lands (NFWL, 1978) and natural communities (Table 2.7-23). Confirmed Chiropteran species similar to both natural and mined communities include the Yellow bat and Red bat. Other species of confirmed large and intermediate-sized terrestrial mammals in natural communities may also be found on mined lands. The most interesting species of this type confirmed on the mined lands is the Southeastern weasel (NFWL, 1978). Aquatic and semi-aquatic species of mammals were not always found in settling areas on the mines. The River otter was the only mammal of this species group to be confirmed as on-site. Round-tailed muskrat may occur in the study area (Table 2.7-4 and Section 2.7.5.2) in appropriate habitat; its existence on mined land settling areas is doubtful due to the steeply sloping nature of the sides of the settling areas. Also not observed in aquatic situations was the Beaver. Fossorial, semi-fossorial, and/or burrowing species such as the Eastern mole were found only in suitable substrate conditions in the mined lands. Eastern mole "trails" were evident in the Suwannee River mine complex reclaimed area and unreclaimed mine area. They were also noted in the sand-tailings-stressed tree area of the Swift Creek Mine. The Southeastern pocket gopher was not observed on the mined lands.

Carnivore species such as the Gray fox and Bobcat appeared quite frequently on the mine site. This may be in response to the higher small mammal abundance on site as compared to availability of small mammals in natural communities (Table 2.7-26). White-tailed deer tracks were seen on both mine areas during fieldwork.

Of the 51 potential species in the five mile study area (Table 2.7-4), 14 (27%) have been confirmed on the Swift Creek mine and 21 (41%) have been confirmed on the Suwannee River mine site. As mentioned previously, 28 (55%) species have been confirmed in the natural communities of the Swift Creek watershed.

The most obvious difference between the mammalian fauna of the Swift Creek natural community and the mined areas is the absence or limited presence of arboreal species and certain aquatic semi-aquatic and fossorial-burrowing species (Table 2.7-23).

Trapping of small mammals revealed a greater trap success and number of indivudals (abundance) on mined lands than on natural communities (Table 2.7-26). The number of species collected was the same. However, species composition was somewhat different (Tables 2.7-22, 2.7-24, 2.7-25). The basis of this difference lies in the physical characteristics of the vegetative components present in the natural communities and the mined land phases. This reason, as well as substrate changes, are responsible for the differences in the mammalian community makeup between the mined land phases and the natural communities.

2.7.4.3.2 Birds -- Two hundred and thirty-five species of birds are expected to utilize the variety of habitats within the Swift Creek watershed. All of the habitats that occur in the five-mile study area are found in this watershed and contain the same avifauna discussed in Section 2.7.3.2.2. To quantify and determine the relative abundance of the wintering species in these habitats, IPA (Indice Pouetuel d'Aboundance) counts (Blondel et al., 1970) were used to obtain an index of birds per hour (Figure 2.7-18).

In the sandhill communities found on the ridges that parallel the Suwannee River, 15 of the 68 expected species were found. Many of the expected species are summer residents or spring and fall transients and do not occur in the area during the winter months when the survey was conducted. Of the wintering species, the Yellow-rumped warbler (22 birds/hour) was the most abundant species with the year-round resident Pine warbler (17 birds/hour) also being common (Table 2.7-27).

The pine-palmetto flatwoods sampled along Swift Creek were old-aged longleaf pines with a very dense undergrowth; not the open fire-controlled flatwoods that naturally occurred in the area. The flatwoods communities of this area could support an expected 82 species of birds. Thirteen species were recorded in this habitat (Table 2.7-28) during our winter survey. Of these, the resident Rufous-sided towhee (12 birds/hour) and the Carolina wren (9 birds/hour) were the most abundant species encountered.

The Southern mixed hardwoods were found to have a winter population of 18 species (Table 2.7-29). The Carolina wren (11 birds/hour) and Pileated woodpecker (5 birds/hour) were the most abundant species. The total year-round expected species list for this habitat includes 90 species. However, many of these only pass through or summer here and were not expected to occur in the habitat during our winter survey.

A total of 44 species of birds would be expected to use the bayheads along Swift Creek. We encountered 16 species here during our winter survey (Table 2.7-30). The Yellow-rumped warbler (11 birds/hour), White-throated sparrow (5 birds/hour), Carolina wren (2 birds/hour) and Red-bellied woodpecker (2 birds/hour) were the most abundant winter species. A total of five species of woodpeckers were found in this habitat.

The birds of the mixed hardwood swamp (Table 2.7-31) varied with the different habitats found in this system. Birds found associated with the creek were the Wood duck (11 birds/hour), Belted kingfisher (2 birds/hour), Anhinga (1 bird/hour), and the Great blue heron (1 bird/hour). The open grass marsh bordering the creek attracted the Eastern phoebe (1 bird/hour), Red-winged blackbird (4 birds/hour) and Red-tailed hawk (1 bird/hour). The wet hardwoods were occupied by the Red-shouldered hawk (4 birds/hour), Pileated woodpecker (3 birds/hour) and Carolina chickadee (4 birds/hour). The undergrowth, where the wet woods and dry woods meet, consists of a tangle of briar that attracts birds such as the Carolina wren (14 birds/hour), Cardinal (13 birds/hour), Hermit thrush (4 birds/hour), Rufous-sided towhee (4 birds/hour), House wren (3 birds/hour), Gray catbird (3 birds/hour), and Yellow-rumped warbler (3 birds/hour).

Cypress heads which drain into Swift Creek via small creeks vary in the amount of water and undergrowth. To form a fair picture of the birds that use this habitat, half the counts were done in wet, open cypress heads and the other half in densely undergrown cypress heads.

The major bird species encountered (Table 2.7-32) were the winter resident Swamp sparrow (5 birds/hour) and the Red-bellied woodpecker (3 birds/hour). The Red-shouldered hawk (2 birds/hour) uses cypress heads as nesting and feeding habitat but does range out over other habitats.

The open agricultural lands provide habitat for many winter residents of this area (Table 2.7-33). These birds breed and summer on northern prairies, tundra and other open grasslands. They include five species of sparrow. Field sparrows (100 birds/hour) and Chipping sparrows (40 birds/hour) predominate the lands because of their conspicuous presence in large flocks. The less visible Vesper sparrow, Swamp sparrow and Song sparrow also occur on these lands. The Black vulture (16 birds/hour) and Mourning dove (13 birds/hour) were the most abundant year-round residents found in the agricultural lands.

Three types of disturbed habitats were surveyed on the Swift Creek mine site: an inactive settling area, site prepared area and mixed lands (Figure 2.7-19). The inactive settling area consisted of cattail marsh, mud flats, and dead cypress heads. In this area, 35 species of birds were encountered (Table 2.7-34). The Green-winged teal (275 birds/hour) and the Red-winged blackbird (221 birds/hour) were the most abundnat species. An additional 6 species of ducks and 6 species of shorebirds were also found using this man-made marshland. A high number of raptors (7 species) were recorded for this area indicating an abundnace of prey species for these predators.

The site prepared area, where the proposed complex is to be constructed, consists of cleared pine woods with a few cypress heads left in the area. The birds found using the area were characteristic birds of an old field situation and the species composition is similar to that found on agricultural lands in the area (Table 2.7-35). The introduced Starling (22 birds/hour) was the most abundant bird in the area. This species is often found associated with man and his strucutres. The resident Mourning dove (16 birds/hour) was the next abundant species. A total of 29 species were recorded in this habitat with 11 species being winter residents of the area.

The birds of the mined lands (Table 2.7-36) are mainly aquatic species living in the mine cuts or upland species found on the tailings piles. The mine cuts at Swift Creek, unlike the older cuts at the Suwannee River Mine, are not covered with water hyacinths. Ducks found in this area are mainly diving ducks. The Turkey Vulture (82 birds/hour) was the most abundant bird and roosted on the tailings piles.

Occidental's Suwannee River Mine was also surveyed (Figure 2.7-19). Because of its active state, habitats are found there which are not presently found on the Swift Creek Mine site but will be created there in the future. Four habitats were surveyed: the active settling area, inactive settling area, reclaimed area and the mined area.

The active settling areas (Table 2.7-37) provided a large amount of feeding area for waterfowl, shore and marsh birds. The American Coot (758 birds/hour), Red-winged Blackbird (321 birds/hour) and the Great Egret (179 birds/hour) were dominant. A total of 49 species of birds were observed in the active settling areas. Among these, waterbirds were predominant, and raptors and blackbirds were common.

In the inactive settling area, 44 species of birds were encountered (Table 2.7-38). The American Coot (31 birds/hour) and the American Wigeon (30 birds/hour), open water birds, were most abundant.
Of the 44 species encountered, 21 species were aquatic, and the remainder were principally upland birds. The upland species were either

birds that feed in bushes and small trees or species that are found in the open fields. Six species of hawks were found to feed in these areas indicating a large population of prey species (large insects, rodents and small birds).

On the reclaimed areas at the Suwannee River Mine, 58 species of birds were recorded (Table 2.7-39). Reclamation has created both open water and upland old-field habitat. Most birds were encountered on the open water or its edge.

The mined lands of the Suwannee River Mine are similar but older than those of Swift Creek Mine and, therefore, comprise different habitats. Waters are covered by a mat of water hyacinths, thus creating habitat for the Red-winged Blackbird (57 birds/hour). Bayberry bushes grow on the tailings areas allowing the Yellow-rumped Warbler (18 birds/hour), Eastern Phoebe (3 birds/hour), Mockingbird (2 birds/hour) and House Wren (2 birds/hour) to find cover and food. Other birds feed along the waters edge, on cleared areas, and in the few open patches of water that do exist (Table 2.7-40).

No point counts were taken on the sandtailings because birds were lacking in this habitat. The Marsh Hawk, Red-tailed Hawk, American Kestrel, Savannah Sparrow, Killdeer, and Red-winged Blackbird were observed in this habitat. The hawks mainly were flying over or roosting in the habitat. The other observed birds were ground feeders, but because little cover is provided, the area only has limited use.

2.7.4.3.3 Herptiles -- The Swift Creek watershed comprises the full range of habitat types present within the five-mile study area. The same qualitative assessment of the herpetofauna made in Section 2.7.3.2.3 can be applied to the Swift Creek Watershed. A quantitative sampling of the area was not felt to be justifiable due to the time of year. Winter months are not conducive to effective herpetological, quantitative sampling. Therefore, a qualitative approach supplemented with the literature and other field investigations (NFWL, 1978) were felt to be the most adequate way to present the herpetological fauna. A comprehensive species list with preferred habitats and acknowledgement of confirmed species is presented in Section 2.7.3.2.3. The occurrence and abundance of the herpetological components of rare and endangered species is presented in Section 2.7.5.2.

2.7.5 OTHER IMPORTANT BIOLOGICAL CONSIDERATIONS

2.7.5.1 Unique Natural Communities

The upland hardwood forests of north-central Florida are one of the outstanding vegetation features of the region. Upland mixed hardwoods are best developed in areas where limestone and phosphatic deposits outcrop (Monk, 1965). These areas are intermediate between lands having poor drainage and those with excessive drainage (Ansley, 1952). They also develop in less fertile areas when fire has been eliminated long enough to permit succession to progress beyond the subclimax pineland stage.

The southern mixed hardwood community is generally considered to be the climax on upland areas (Harper, 1906; Laessle, 1952; Kurz, 1944; Braun, 1950; Hubbell, Laessle and Dickinson, 1956; Laessle and Monk, 1961; Quarterman and Keever, 1962). The complexity and floristic diversity of the southern mixed hardwood forest is one of its outstanding features. According to Monk (1965), the physiognomy of the community is characterized by its diversity, for it comprises at least 71 tree species (30 families). Forty species have the collective potential to form a more or less continuous canopy which averages 90% cover. Thirty understory species plus canopy transgressives usually form a continuous subcanopy. Shrub and herb strata vary in height and are normally discontinuous except under broken areas in the canopy and understory.

Within the five-mile study area and Swift Creek watershed, southern mixed hardwoods are restricted (3015 acres) to small isolated woodlots and strands along the Suwannee River and its tributaries (Figures 2.7-6 and 2.7-7). These areas are mature stands with many large oak, magnolia, and hickory specimens. In the transect data collected by LaMoreaux and Breedlove (1977) along Rocky, Roaring and Swift Creeks, a total of 32 overstory species were recorded, 18 of which were considered important within the canopy. These species included red maple, laurel oak, live oak, water oak, blackgum, river birch, bald cypress, sweetgum, slash pine, loblolly pine, pignut hickory, American holly, white ash, Carolina ash, ogeechee tupelo, and magnolia. Other species observed during the present study were elm, hornbeam, white oak, swamp chestnut oak, and red oak. In addition, a total of 39 understory species and 16 herbaceous species were encountered by LaMoreaux and Breedlove (1977).

Within the study area, the southern mixed hardwood forest increases the habitat diversity and ecoton of the predominantly pine flatwoods/cypress/bay system, providing additional food and nesting habitat for wildlife. Species which benefit from the higher habitat diversity include wild turkey, gray squirrel, white-tailed deer, several warblers, solitary vireo and the Louisiana waterthrush, a species of special concern (Layne, 1976a).

The deeply incised stream channel, limestone ravines, and the mature, closed canopy of the surrounding forest along the lower reaches of Swift Creek and Camps Branch are unusual and noteworthy. The esthetic appeal of this area, its diverse flora, the edge and wildlife habitat it provides, and the maturity of the vegetation makes these southern mixed hardwoods a "unique natural community" within the project area.

2.7.5.2 Endangered, Threatened or Rare Animals and Plants

Fifty-four vertebrate species (Table 2.7-41) of rare or endangered animals have been considered as potential within the study area (NFWL, 1978). Of these, 26 (48.1 percent) have been confirmed in the study area (Table 2.7-42) based upon field observations, literature, and previous studies of the Upper Suwannee River and Suwannee River Chemical Complex (NFWL, 1978). Twenty-one are considered potential in their likelihood of occurrence and seven are not thought to occur in the study area. These species are considered endangered, rare, threatened, or of special concern by various federal, state, and conservation organizations. The basis of these species status is generally a function of population declines or fluctuations caused by outside sources (pesticides and persecution), habitat loss or degradation (urban development, agriculture), or lack of demonstrated presence. Protection by laws is offered to some of these species by federal and state agencies. Since species are not geographically restricted to political boundaries, the status of these species in the State of Georgia, as well as Florida, is considered due to the proximity of the study area to the Florida-Georgia border. Conservation groups (e.g., the Florida Committee on Rare and Endangered Plants and Animals and the Southeastern Section of the Wildlife Society) as well as scientific species-specific organizations (e.g., the American Ornithologists Union and the American Fisheries Society) lists are also considered. These, however, do not offer any legal protection, but are of concern to specialists in their respective fields.

A brief account of each species focuses on their habitat, basis of classification, unique or special characters and potential for occurrence in the study area. Two baseline maps (Figure 2.7-20 and 2.7-21) are provided for identifying areas of confirmed observation or collections of species described in the text. It should not be construed to mean that because a species is present in one area it is not present elsewhere. It does mean that if a species exists in a given locality, the potential for occurrence in other areas of preferred or suitable habitat is heightened.

That a species has not been confirmed in the study area is no proof that it does not exist there. A species whose geographical range is sympatric with the study area may be found in appropirate habitat. Thus, local distribution of a particular species within the study may best be described as distribution of preferred or appropriate habitat.

2.7.5.2.1 Mammals --

Felis concolor coryi -- (Florida panther)

Historically, the Florida panther ranged throughout much of the southeastern United States (Hall and Kelson, 1959). However, its present distribution is uncertain. Declines in populations to an endangered status has been attributed to depradation and persecution by man, as well as to habitat loss (Williams, 1976a). Due to its scarcity and secretive nature, little is known concerning the Florida panther's ecological requirements. The majority of the literature on panthers deals mainly with western subspecies. There appears to be no habitat specificity with the exception of an ample food supply (White-tailed deer, Odocoileus virginianus) and dense vegetation for escape cover (Layne, 1974). Unconfirmed reports have come from the Osceola National Forest and Okefeenokee Swamp (Chris Beldon, Florida Game and Fresh Water Fish Commission, personal communication). Unconfirmed reports have been made near Hunter Creek, Hamilton County, Florida (Figure 2.7-21) by Occidental employees (Mason Joye, Occidental, personal communication). There is a remote chance of the Florida panther occurring in the study area as a transient. Occurrence on the mine sites is highly unlikely due to limited food resources and the lack of escape cover.

Myotis grisescens -- (Gray bat)

The Gray bat's range is limited to Alabama, Kentucky, Missouri, Tennessee, and the Florida panhandle (Barbour and Davis, 1969). The species is limited in its tolerance of roosting habitats requiring caves with narrow temperature ranges (Humphrey and Tuttle, 1976); although two summer colonies have been reported outside of caves (Barbour and Davis, 1969). Migration (sometimes long distances) occurs between summer and winter roosts. Foraging occurs over streams, rivers, reservoirs, and adjacent vegetation (Humphrey and Tuttle, 1976).

One specimen has been collected near Lake City, Columbia County, Florida (Florida State Museum) and two were collected in Osceola National Forest, Baker County, Florida (NFWL, 1978). One of the specimens collected in Osceola National Forest was a juvenile. The time of year of collection and the age would seem to be indicative of a nearby nursery colony. There is appropriate foraging habitat in the study area (Swift Creek, Camps Branch, etc.) and possible roosting areas. However, occurrence on the mined lands is highly unlikely.

Trichechus manatus -- (Manatee)

The Manatee has historically suffered population declines as a result of overharvesting. Recently, boats, barges and lock operations have resulted in heavy mortality (Campbell and Powell, 1976). The Manatee inhabits aquatic areas (fresh and salt water) with depths of 1.5 m or more. Canals, rivers, bays and estuarine habitats have been reported to support Manatees (Hartman, 1974, 1976). Critical habitat for the Manatee has been designated in the United States (Federal Register, 41:41916, 24 September 1976). However, there is no critical habitat designated in the study area. The Manatee is herbacious and will take a wide variety of submergent and emergent vegetation (Hartman, 1971). This species is known from the lower reaches of the Suwannee River to just above the confluence with the Santa Fe River (Moore, 1951; Hartman, 1974). Upstream on the Suwannee River from the town of Branford, shoals and rapids would restrict movements of Manatees into the upper reaches of the Suwannee River except possibly during high water periods (NFWL, 1978). Therefore, it can be reasonably concluded that the likelihood of the Manatee occurring in the study area on the Suwannee to be negligible.

Sciurus niger shermani -- (Sherman's Fox Squirrel)

Sherman's fox squirrel was an inhabitant of the virgin pine forests of the Southeastern coastal plain (Moore, 1957). These forests are for the most part gone now and this species is now found in open pine-palmetto flatwoods, high pinelands, swamp borders and bayheads (Moore, 1946, 1957). The primary concern for this species is loss and alteration of habitat (Ehrhart, 1976). Fox squirrels were observed in the nearby Osceola National Forest (NFWL, 1978) and one specimen was collected near Lake City, Columbia County, Florida (UF 4742). Habitat exists in the study area and the likelihood of occurrence is at least minimal in appropriate habitat. Occurrence on mined lands is precluded due to the absence of substantial stands of trees.

Peromyscus floridanus -- (Florida Mouse)

The Florida mouse is endemic to Florida. It is restricted to xeric-scrub vegetation associations such as high pinelands and xeric hammocks

(Layne, 1963). Gopher tortoise (Gooherus polyphemus) and Southeastern pocket gophers (Geomys pinetus) burrows are utilized for nest sites (Blair and Kilby, 1936; Johnson and Layne, 1961). The current known geographical range is just outside the study area (Layne, 1976b). This species was not collected during a survey in the Osceola National Forest (NFWL) and our efforts in the Swift Creek drainage basin. However, a specimen has been collected near Falmouth, Suwannee County, (NFWL, 1978). There is a potential for the Florida mouse to occur in the area, but based on the geographical range and trapping efforts, its occurrence is unlikely.

Ursus americanus floridanus -- (Florida Black Bear)

The basis for classification of this species is habitat loss (Williams, 1976b). Williams (1976b) maintains that there are only two areas in Florida that support substantial populations: 1) Apalachicola National Forest and 2) Okefeenokee Swamp south up to and including Osceola National Forest. Optimal habitat for this species is an interspersed combination of pine-palmetto, flatwoods, swamps, scrub oak, bayheads, and hammocks (Harlow, 1962). Food habits vary seasonally, with herbaceous matter and ocasionally insects and armadillos taken (Harlow, 1962; NFWL, 1978). Florida black bears have been observed in the study area (Steve Stafford, Florida Game and Freshwater Fish Commission, personal communication) and one was reported killed in the Bee Haven Bay area north of the Swift Creek and Suwannee River Chemical Complex (Figure 2.7-20) (Jim Mykytka and Steve Stafford, Florida Game and Freshwater Fish Commission, personal communication).

Mustela vison mink -- (Southern Mink)

Southern mink are usually solitary and nocturnal in habit (Smith, 1971). Geographically, it is widely distributed in the eastern United States. The panhandle region eastward to the Okefenokee swamp is the range of this species in Florida (Brown, 1976a). Preferred habitat is considered to be a wide variety of aquatic areas such as lakes, streams, marshes, and swamps (Hall and Kelson, 1959). These habitats are available in the study area; however, based on the standpoint of demonstrated presence, occurrence in the area would be extremely rare.

Mustela frenata olivacea -- (Southeastern Weasel)

There is no habitat specificity shown by this species (Moore, 1945 ; Brown, 1976b). They occur in all major habitat types, including urban areas (Brown, 1976b). In Florida, this species ranges throughout the Florida panhandle and approximately the northern one-third of the Florida peninsular (Hall, 1951). A specimen was taken in Columbia County, Florida (Brown, 1976b), and tracks were observed at the Occidental Chemical Company Suwannee River Mine Inactive Settling Area 3A (Figure 2.7-21) (NFWL, 1978). These mine lands support an abundance of small mammals for food resources (Section 2.7.4.3.1, NFWL, 1978) and den sites are available in the form of culverts and debris associated with mining. However, population levels are probably low as they are elsewhere in their range.

Sorex longirostris longirostris -- (Southeastern Shrew)

It has been, most probably, demonstrated that the Southeastern shrew is the rarest small mammal in the state (Brown, 1976c). Prior to 1974, only 15 specimens from six localities were known. In the past five years, 34 more specimens have been collected (Florida Game and Freshwater Fish Commission, 1976; NFWL, 1978). This increase has been due to a change in collecting techniques from snap-traps to pitfalls. Little is known of the ecological requirements of this species. Their preferred habitat is assumed to be swamp forest and moist river floodplains, but they have also been recently collected in pine-palmetto flatwoods, high pinelands as well as southern mixed hardwoods (FGFWFC, 1976; NFWL, 1978). It can be reasonably assumed that the Southeastern shrew is an inhabitant of the study area.

Neofiber alleni -- (Round-tailed Muskrat)
Population fluctuations and loss of habitat make the Round-tailed muskrat a species of special concern (Tilmant, 1976). Typically, its preferred habitat is shallow marshes with emergent vegetation of maidencane (Panicum hemitomon) and pickerel weed (Pontederia lanceolata). Extremes in populations are seen in areas of dense vegetation and water levels between 15 and 50 cm with a soft substrate (Birkenholz, 1972).

Geographically, it occurs from Southeastern Georgia, throughout the Florida peninsula and west to the Apalachicola River in the Panhandle. It appears to be rare to non-existent on the upper Gulf coast and in Nassau and Duval Counties. Populations of Round-tailed muskrats are known in the Okefenokee swamp region and as far south as Baker County, Florida, (Hall and Cockrum, 1953; Schwartz, 1953). This species was not found in the Osceola National Forest, but was assumed an inhabitant of the area in appropriate habitat (NFWL, 1978). The Round-tailed muskrat is probably an inhabitant of the study area wherever there is an appropriate habitat. Settling areas in mined land areas have, however, too steep sides to support the species.

Eptesicus fuscus -- (Big Brown Bat)

The Big brown bat is known to use a wide variety of habitats (Jennings, 1958; Barbour and Davis, 1969). Lakes, fields, wooded residential areas, high pinelands and cypress swamps are a few of these areas. Roost sites range from buildings, caves and mines to underneath bark on trees (Phillips, 1966; Humphrey, 1975). The species is a beetle specialist in its feeding habits (Phillips, 1966). It was observed along the Suwannee River up and downstream from White Springs (Figure 2.7-20) and in the Osceola National Forest (NFWL, 1978). Another specimen was observed in 1968 near White Springs by Jennings (UF 2094). The Big brown bat is an inhabitant of the study area along the Suwannee River and may utilize portions of Swift Creek. It may also use aquatic areas in mined lands for foraging.

Lasiurus cinereus -- (Hoary Bat)

The Hoary bat is a migratory species which migrates south through Florida in the late fall (October and November) and northward in late winter and early spring (February and March) (T.L. Zinn, Florida State Museum, personal communication). Observations have indicated that this speices is seemingly associated with creek, swamp and riverine habitats (T.L. Zinn, FSM, personal communication; NFWL, 1978). Geographically, the species ranges from the Hawaiian Islands to Iceland and from Southhampton Island to central South American (Barbour and Davis, 1969). A specimen was collected in the Osceola National Forest and they have been observed along the Suwannee River (Figure 2.7-20) between White Springs and Deep Creek (NFWL, 1978). Creek swamp habitat exists in the study area along Swift Creek and the Hoary bat may utilize this area for foraging during migration.

Plecotus rafinesquii -- (Southeastern Big-eared Bat)

Roost areas are usually culverts, shacks or artificial grottos (Jennings, 1958). Habitat preference appears to be hammock type situations (Barbour and Davis, 1969), cypress heads and cultivated fields (Harper, 1927). Little is known of its ecological requirements in Florida. Although it is known to migrate, this species has been collected in Baker County, Florida and observed (unconfirmed though) in Osceola National Forest (NFWL, 1978). Appropriate habitat and roosting sites exist in the study for this species. However, its occurrence, in the area and elsewhere in Florida, is most likely rare.

2.7.5.2.2 Birds --

Haliaeetus leucocephalus leucocephalus -- (Southern Bald Eagle)

The Bald Eagle has declined in population in much of its breeding range. This decline has been attributed to pesticide poisoning and, to a lesser extent, loss of habitat (Hammerstrom, *et al*., 1975). Florida populations were not heavily affected by pesticides; loss of habitat, however, has adversely affected the population (Peterson and Robertson, 1976). Once primarily a coastal bird, much of its prime habitat has been lost to coastal development. In recent years, an increase in interior nesting has been noticed (Steve Nesbitt, FGFWC, personal communication). Because of this loss of habitat, the State of Florida protects the Southern Bald Eagle as a threatened species. The United States Government lists the entire subspecies as endangered because of unstable populations north of Florida. The only Bald Eagles observed in the study area were found feeding and roosting in the settling areas of the Suwannee River Mine (Figure 2.7-21). These are believed to be non-breeding individuals. The study occurred during the period of courtship and nest-building of the North Florida eagles. No such courtship behavior or carrying of nesting material was observed. In addition, many of the birds observed were in immature plummage. Except for in the mined lands, no other eagles were encountered in the study area.

Falco peregrinus (Peregrine Falcon)

Like the eagle, the Peregrine Falcon also suffered from pesticide poisoning in the late 1940's and 1950's (Hickey, 1969). In twenty years, the eastern subspecies was extripated and other subspecies were greatly reduced in numbers. The species is now making a comeback and is being reintroduced in its eastern range (Cade, 1974). The Peregrine Falcon feeds on ducks, shorebirds, and large passerines that it catches in large open tracts of marshlands or fields (Bent, 1961). Little feeding habitat for this species existed in the study area before mining. The settling areas provide suitable prey densities for this species. A male Peregrine Falcon was observed on November 16, 1977, roosting in Settling Area No. 8 at the Suwannee River Mine (Figure 2.7-21). This bird was not encountered again and is believed to have been a transient rather than a wintering bird

Mycteria americana -- (Wood Stork)

In the study area, Wood Storks have been observed feeding and roosting in the mined areas (Figure 2.7-21). The fluctuating water levels of the mined areas simulate the preferred feeding habitat for this species, receding waters where prey species are concentrated and trapped (Ogden et al., 1976). Other habitats that occur in the study area where Wood Storks feed, especially during droughts such as the summer of 1977, are cypress heads, creek and stream beds, bayheads, the Suwannee River, low ponds, and drainage ditches. Swift Creek, during low water, could serve as feeding habitat for this species especially the upstream portions. Cypress heads and dead trees over water serve as roosts and rookeries for this species. No rookeries are located in the study area with the closest being on Newnan's Lake in Alachua County, 60 miles south of the study area (Nesbit, 1973). The Storks observed in the study area are believed to be non-breeding or post-breeding wanderers.

Picodes borealis -- (Red-cockaded Woodpecker)

The Red-cockaded Woodpecker is an extremely habitat dependent species. It requires open mature to over-mature pine flatwoods, a subclimax condition caused by frequent burning (Sprunt, 1954). Fire control and timber management practices have reduced this type of habitat so that today this species is endangered. Much of the study area is covered in pinelands, but the condition of these areas is unsuitable for this species. All the available habitat we surveyed from the air and ground contained pines that were either too young or in too dense of stands to be considered optimum habitat for this species. In several tracts of pinelands, recordings of species-specific calls were played but no response was obtained.

Vermivora bachmanii -- (Bachman's Warbler)

The Bachman's Warbler declined to the point of endangerment before any indepth studies on its life history could be carried out. It is believed to have suffered from habitat loss when the large river swamps in Louisiana, Mississippi, Alabama, Georgia, and South Carolina were harvested. It was never known as a breeder in Florida, but passed through during migration (Sprunt, 1954). The study area could provide feeding habitat for this species during migration, though, due to its small population, it would be unlikely that it would be detected in the area at these times.

Pandion haliaetus -- (Osprey)

The Osprey is a bird of the open water where it feeds on fish (Bent, 1961). In the study area, there are no large natural bodies of water. However, the mined lands provide feeding habitat for this species. Single birds were observed during the summer using the active settling areas (Figure 2.7-21) at the Suwannee River Mine (J. Wester, personal communication). No nesting signs of this species have been observed in the study area.

Falco sparverius paulus -- (Southeastern Kestrel)

A subspecie of the American Kestrel, it is non-migratory and smaller than the nothern subspecies (Chapman, 1966). The Southeastern Kestrel occurs throghout the Southeast north to South Carolina. Habitat destructionand pesticide poisoning are the major causes of decline for this specie (Wiley, 1976). A bird of the open fields and thinly wooded areas, it nests in dead trees where woodpeckers have made cavities. It feeds on insects, small mammals and reptiles. In the winter, migrants from the north invade the range of the Southeastern Kestrel creating problems in winter censusing. The Northern Kestrel is larger and subspecific differences can be detected with the bird in hand. Of the five kestrels we captured, none proved to be the Southeastern Kestrel. Habitat does exist in the study area for this species.

Grus canadensis pratensis -- (Florida Sandhill Crane)
On December 9, 1977, ten Sandhill Cranes were observed flying over the intersection of U.S. 129 and SR 132 in the study area. These birds may have been the northern migratory subspecies of the Sandhill Crane which passes through this area on its southward migration around this date. The Florida Sandhill Crane has been recorded as a resident of several nearby bayheads (Pinhook Swamp and Impassable Bay in Comumbia and Baker County) and also is known to breed in the Okefenokee Swamp in nearby Georgia (Williams and Phillips, 1972; Steve Adams, personal communication). Bee Haven Bay is similar to Pinhook Swamp and Impassable Bay and may contain resident cranes, though on February 13, 1978, when we flew over the area, we encountered no Sandhill Cranes.

Sterna albifrous -- (Least Tern)
Historically, the Least Tern nests on coastal beaches. Due to human disturbance, many of the Florida colonies have disappeared or moved to less suitable man-made habitats such as roof tops and sand tailings at phosphate mines (Fisk, 1976). Breeding of this species has occurred in the mined areas of Polk County, Florida. Least Terns were observed on the Suwannee River Mine (Figure 2.7-21) in June of 1977 (J. Wester and

R. Repenning, personal communication) but were not found to breed. These were most like vagrants from the coast. Breeding attempts by this species at the Suwannee River Mine would, no doubt, fail due to the presence of a large number of egg-eating mammals in the area (i.e., Bobcat, Raccoon, Opossum, Armadillo, Skunk and Grey Fox).

Serius motacilla -- (Louisiana Waterthrush)
The Louisiana Waterthrush has been recorded breeding in Gainesville, Florida, south of the study area along a wood edged stream (Austin, 1965) similar to the lower portions of Swift Creek and Camp Branch. The species is known to breed only in scattered localities in north Florida. This species winters in South America and, therefore, could not be censused during our study. The habitat in the mixed hardwood swamp and bayheads along the Swift Creek drainage may be suitable for this species.

Setophaga roticilla -- (American Redstart)
The American Redstart breeds along the Yellow and Escambia Rivers in western Florida and in most of central and eastern North American (Stevenson, 1976a). It is considered rare in Florida because Florida is the southern terminus of its breeding range. However, it is a common migrant through Florida and, therefore, can be found in the study area in season. The various habitats found in the study area, with the exception of agricultural and mined lands, provide this species with feeding habitat during migration.

Little Blue Heron, Great Egret, Snowy Egret, Louisiana Heron, Black-crowned Night Heron, Yellow-crowned Night Heron, Least Bitter, White Ibis -- All of the above birds depend on wetlands. The decrease in wetlands in Florida in the past 40 years and the subsequent decrease in the populations of these birds are the major reasons for listing these birds as Species of Special Concern (Layne, 1976a). All of the above, with the exception of the Yellow-crowned Night Heron, have been recorded in the study area. A large rookery containing all these species except the Yellow-crowned Night, Louisiana Heron and the Least Bittern existed in the Suwannee River Mine Active Settling Area No. 8 (Figure 2.7-21 (Nesbit, personal communication) (Table 2.7-43). In addition, 100 pairs of Great Egrets nested in a beaver pond just north of the Big Shoals on the Suwannee River just east of the study area (Nesbit, personal communication). During our study, these species were encountered only in the mined lands. A census of the mined lands yielded a large number of these species (Table 2.7-44). Habitat for them does exist, however, in the upper reaches of Swift Creek in the cypress heads, bayheads, and agricultural ponds. The absence of Yellow-crowned Night Herons and low numbers of Louisiana Herons (under ten birds in the area) is due to the more coastal nature of these species. The Least Bittern is a summe resident and, therefore, no survey was made for it though records of its presence do exist (J. Wester, personal communication).

Accipiter cooperii -- (Cooper's Hawk)

Several Cooper's Hawks were observed during the study in the settling areas of the Suwannee River and Swift Creek Mines (Table 2.7-44, Figure 2.7-21). These sightings occurred during the fall migration of thi species. The Cooper's Hawk is a rare resident in north Florida that is occasionally found in open woods and farmlands (Snyder, 1976). The pine lands in the area provide habitat for this species as does woodland edge along farmlands and mined lands. It has declined in recent years due to pesticide poisoning.

Hydroprogne caspia -- (Caspian Tern)

The Caspian Tern has been observed feeding over Settling Area No. 8 at the Suwannee River Mine during migration (Figure 2.7-21). This species is extremely coastal in habit and occurs inland as a vagrant only. The study area does not represent optimum habitat for this species.

Picoides villosus -- (Hairy Woodpecker)

The only Hairy Woodpecker found during the study was found in White Springs along the Suwannee River just outside of the study area (Figure 2.7-20). Habitat for this species are not well known. It has been reported using cypress heads, pinelands, mixed hardwood swamps, sandhills, and southern mixed hardwoods (Owre, 1976). Throughout Florida, this species occurs in low numbers and it is not surprising that we have not encountered it in our study area. Destruction of this habitat is believed to be the reason for this species decline.

Sitta carolensis -- White-breasted Nuthatch

The White-breasted Nuthatch was once common in Florida south to Polk County. It lived in open flatwoods. It is now found only in small numbers in a two-county area north of Tallahassee (Stevenson, 1976b). The reason for its decline is given as habitat destruction and climatic changes. It may occur as a winter wanderer in the study area but not as a resident breeder (Stevenson, 1976b).

Helmitherus vermivorus -- (Worm-eating Warbler)

The Worm-eating Warbler is a bird of the deciduous forests, where during the breeding season, it inhabits steep-sided deciduous woodlands, a habitat that is not found in the study area. This species migrates through the area in the spring and fall. It is considered rare in Florida because it has only been found breeding in the extreme northern corner of Florida (Stevenson, 1976c).

Falco columbarius -- (Merlin)

The Merlin, a falcon of the open fields, prairies, and marsh, feeds on medium-sized passerines, small shorebirds, and occasionally rodents (Bent, 1961). The Meadowlark, Blackbirds, and Killdeer of the local agricultural areas may provide food for migrating Merlins. The mine lands also provide prey for this species. The Merlin does not breed in the study area but only migrates through the area. Though no Merlins were observed in the study area, the likelihood of occurrence is good.

2.7.5.2.3 Reptiles --

Alligator mississippiensis -- (American Alligator)

The American alligator is usually an inhabitant of all aquatic habitats, including ponds and/or lakes in residental areas (Fogarty, 1976a). This species was once common throughout the Southeastern United States, but over exploitation for skins has depleted populations in many areas. Habitat destruction has also played a minor role in population declines.

Since state and federal protection became effective, alligator populations have made significant comebacks in certain areas.

The American alligator is known to occur within the study area in settling areas on Occidental property (Figure 2.7-21).

Stilosoma extenuatum -- (Short-tailed Snake)
The short-tailed snake is endemic to Florida. Geographically, it occurs from Suwannee and Columbia Counties southward to Hillsborough, Orange and Highlands Counties in appropriate habitat. Longleaf pine, Turkey oak and xeric hammocks are habitats in which this species occurs (Campbell, 1976). The Short-tailed snake seems to select these habitats which are over either Norfolk, Blanton or St. Lucie fine soils. It is primarily a burrowing species, and is seldom seen above-ground except in the spring and fall. Little is known of its ecological requirements. The chief concern for this species is its restriction to a habitat type which is dwindling (Campbell, 1976). The Short-tailed snake has been collected near Lake City, Columbia County, Florida. However, an intensive survey of the Osceola National Forest failed to confirm the presence of this species (NFWL, 1978). Although appropriate habitat does exist, the likelihood of occurrence of this species seems minimal, at best.

Chrysemys concinna suwanniensis -- (Suwannee Cooter)
The Suwannee cooter is an inhabitant of rivers, springs runs, and estuarine areas. Population densities reach their extremes in areas of turtle grass flats such as Suwannee Sound (Carr, 1952). This species

mates throughout the year with eggs generally laid during spring and summer. Stomach analyses have indicated a preference for water-weed (*Naias* sp.) (Marchand, 1942).

Geographically, the Suwannee cooter ranges from the Gulf of Mexico from the vicinity of Pinellas County to Franklin County in the Panhandle, and eastward to Columbia County. This species has been collected north of Little Shoals, near White Springs (UF 39895), Hamilton County, Florida (Figure 2.7-20). Turtles, thought to be this species, have been observed basking on the Suwannee River between White Springs and the SR-6 bridge (NFWL, 1978).

The Suwannee cooter is considered as a part of the herptofauna for the study area. However, population levels are considered low due to limited aquatic vegetation in the upper Suwannee River (NFWL, 1978).

Gopherus polyphemus -- (Gopher Tortoise)

The Gopher tortoise usually occurs in open, well-drained, sandy areas. Burrows are constructed in these areas and range from 1.9 to 14.0 m in length and 1.4 to 2.8 m in depth (Hanson, 1953). These burrows also serve as homesites or shelter to such vertebrate species as the Florida mouse, Indigo snake, and Florida gopher frog, as well as a number of invertebrates (Carr, 1952). The Gopher tortoise is completely herbivorous, taking a wide variety of grasses and herbs (Auffenberg, 1966).

Geographically, this species ranges from southern South Carolina and Georgia, to the tip of the Florida peninsula. It also occurs in Alabama, Mississippi, Louisiana, and west into Texas and into southeastern Arkansas. Active Gopher tortoise burrows were noted in several localities of high pinelands in the study area along Swift Creek and are common along the natural levees of the Suwannee River.

Drymarchon corais couperi -- (Eastern Indigo Snake)

The Eastern indigo snake ranges through southeastern South Carolina, southern Georgia, the Florida peninsula, and erratically throughout the Florida panhandle. It has also been recorded from Alabama and Mississippi, but may now be extirpated from these areas (Cliburn and Jackson, 1975; Mount, 1976). This species occurs in a wide variety of habitats which include pine flatwoods, high pinelands, bays, swamps, and hammocks. It will share Gopher tortoise burrows in high pineland habitat (Kochman, 1976). The basis of concern for this species lies primarily in overcollection by snake enthusiasts and the pet trade as well as harm from Gopher tortoise burrow destruction. One specimen has been collected in the Osceola National Forest (UF 39974) and a juvenile was observed on the Suwannee River of Dowling Park (NFWL, 1978). Appropriate habitat exists in the study area and it is reasonably expected that this species should occur in the study area.

Clemmys guttata -- (Spotted Turtle)

Geographically, the spotted turtle ranges from Maine and southern Ontario, throughout the eastern United States to south Georgia and northern Florida. In Florida, the distribution appears disjunct south to Marion County and west to Wakulla County. There are fewer than 10 substantiated or confirmed locality records for the state (Berry and Gidden, 1973).

This species is primarily an inhabitant of grassy ponds, meadows, and shallow bodies of water (Carr, 1952). Terrestrial wanderings have been noted during the breeding season in spring. The basis of concern lies in lack of demonstrated presence and destruction of wetlands (Berry, 1976). Appropriate habitat exists in the study area for this specimen. Although no specimen has been collected in the area, this species is considered a part of the herptofauna with occurrence being rare.

Macroclemys temmincki -- (Alligator Snapping Turtle)

The Alligator snapping turtle is an inhabitant of deep water, rivers, lakes, swamps, and bayous. Predominantly a nocturnal scavenger, the Alligator snapping turtle will also take fish (Allen and Neil, 1950). The geographical range is from northern Florida and Southern Georgia across the Gulf Coastal Plain to central Texas. It also occurs up the Mississippi River Valley to southeastern Kansas, and southern Missouri, Illinois, and Indiana. In Florida, it is known from the Suwannee and Santa Fe Rivers and a majority of rivers in the Florida panhandle (Allen and Neill, 1950; Pritchard, 1976). It is also known from the Okefenokee Swamp (Allen and Neil, 1950). The basis for concern of this species lies in its low reproductive potential and potential easy extirpation from trapping for commercial purposes (Pritchard, 1976). The upper Suwannee River offers potential habitat in the study area for this species. Therefore, the Alligator snapping turtle is considered a component of the herptofauna of the study area.

2.7.5.2.4 Amphibians --

Rana areolata aesopus -- (Florida Gopher Frog)

The Florida gopher frog is found from central Georgia through the peninsula of Florida to the vicinity of Lake Okeechobee. It also occurs from Panama City eastward in the Florida panhandle. It exhibits a unique relationship in utilizing the burrows of the Gopher tortoise (*Gopherus polyphemus*). Juveniles also use burrows of the Old field mouse (*Peromyscus polionotus*) and stump holes. It is restricted in its habitat type to xeric-scrub and high pineland areas. Adults breed in the spring and summer, migrating to nearby high pineland ponds (Carr, 1940). The basis of concern for this species lies in habitat destruction from development and factors deleterious to the Gopher tortoise and its burrow (Fogarty, 1976b). Gopher tortoise burrows are present in the study area and within the Swift Creek drainage. There is a potential for occurrence of this species in the study area. However, occurrence of Gopher tortoise burrows does not necessarily mean that the Florida gopher frog is present. This species was not encountered in the Osceloa National Forest (NFWL, 1978), although appropriate habitat did exist.

Stereochilus marinatus -- (Many-lined Salamander)

The Many-lined salamander ranges geographically from southeastern Virginia to the vicinity of the Osceola National Forest, Florida (Christman and Kochman, 1975; NFWL, 1978). This species occurs in sluggish streams and acidic ponds, preferably where both cypress and sphagnum are present. Feeding habits are unknown. The basis for classification of the Many-lined salamander is its peripheral geographical range in Florida. Peripheral populations are usually subject to fluctuations in size and subsequently to extirpation (Christman, 1976a). The southern and western most collection point is along the Deep Creek in Osceola National Forest, Columbia County, Florida (UF 39968). Potential habitat exists in the study area, but occurrence of this species in the area seems unlikely.

Notophthalmus perstriatus -- (Striped Newt)

This species ranges from southeastern Georgia, south to Orlando, Orange County, Florida. In the panhandle, distribution is from Tallahssee, Leon County, eastward. Habitats are high pineland situations and cypress domes (Christman, 1976b). This species is not known to occur in aquatic areas with predatory fish such as Essox sp. or sunfish (Centrarchidae). The basis for concern lies in this species' spotty, local distribution which makes the populations vulnerable to local habitat disturbance (Christman, 1976b). Appropriate habitat exists within the study area, but likelihood of occurrence is small based on its scattered, local distribution. This species has been collected in the Osceola National Forest, but from only one locality (UF 39970).

Rana virgatipes (Carpenter Frog)

Geographically, the Carpenter frog ranges from the pine barrens of New Jersey south to the Osceola National Forest (Stevenson, 1970; NFWL, 1978). This species was not known in Florida prior to 1968. Before its discovery in the Osceola National Forest in 1977, the southern terminus of its range was north and east of the Osceola (Means and Christman, 1976). Carpenter frogs usually occur in acidic ponds with sphagnum or cypress domes (Means and Christman, 1976). Food habits are unknown. The basis for classification lies in the geographical range having its southern terminus in Florida. The study area lies outside the presently known range, and although suitable habitat exists, occurrence is doubtful.

2.7.5.2.5 Fish --

Acipenser oxyrhynchus -- (Atlantic Sturgeon)

This species occurs on the Atlantic coast from Labrador southward to the St. Johns River. In the Gulf, it occurs from the Mississippi River to Tampa Bay (Gilbert, 1976a). The Atlantic sturgeon is anadromous, ascending the Suwannee River in March to breed and returning to the Gulf in November (Huff, 1975). Exact locations of spawning sites in the Suwannee River are not known, but is believed to be between Ellaville and White Springs. Related species and the Atlantic coast subspecies spawn in shoal areas. These shoal areas exist between Ellaville and White Springs on the Suwannee River. Adult Sturgeon have been observed near Ellaville during the spring and summer months (Huff, 1975) (Figure 2.7-20).

Umbra pygmaea -- (Eastern Mudminnow)

The Eastern mudminnow is not legally protected, but is of concern due to its limited distribution (Gilbert, 1976b). Acidic waters with mud or silt bottoms and an abundance of submerged vegetation are their preferred habitat. Due to their behavioral characteristics (salamander-like habit of resting on the bottom in mud and vegetation), they are difficult to collect by standard fish-sampling methods. Basically, this species is a bottom feeder and probably spawns in flooded backwater areas during high water periods in early spring as does Umbra limi (Peckham and Dineen, 1957). Eastern mudminnows are known to be present within the study area (Gilbert, Florida State Museum, personal communication). This species was found to be abundant in cypress ponds and shallow flatwood streams (frequently in water less than 20 cm deep) in the Osceola National Forest (NFWL, 1978).

Acantharcus pomotis -- (Mud Sunfish)

This species is also of concern due to its limited distribution (Gilbert, 1976c). Shallow, marginal waters are usually required by this species. The Mud sunfish usually occurs in acidic water with a mud substrate and submergent vegetation. Standard fish-sampling techniques are not usually effective in catching this species due to their habit of hiding under logs, in mud, and/or in the submergent vegetation. Reproductive biology of the species is unknown. In the study area, this species may occur in cypress ponds and pine-palmetto flatwood streams. They have been collected in the Osceola National Forest (UF 24010, 24011, 24012) but were not abundant (NFWL, 1978). This species is also known to occur in the study area (Carter Gilbert, Florida State Museum, personal communication).

Enneacanthus chaetodon -- (Black-banded Sunfish)

The basis of concern for this species is its limited and scattered distribution (Snelson, 1976). There are four main areas of distribution; two of which are in the Florida-Georgia area: the highlands of peninsular Florida and the Okefenokee Swamp. The Black-banded sunfish usually occurs in marginal and shallow areas in ponds, lakes, and sluggish streams. The waters are generally acidic with the substrate sand and silt with submergent vegetation. This species has not been recorded from the study area, but a record exists for Baker County, Florida, (Gilbert, 1973). Seehorn (1975) believes the Black-banded sunfish to be a probable inhabitant of the Suwannee River drainage.

Micropterus notius -- (Suwannee Bass)

The Suwannee bass prefers shoal areas with moderate currents and a limestone or sand bottom, with springs and spring runs being optimal habitat (Gilbert, 1976d). Major food items include crayfish and smaller fish as well as other aquatic organisms (Bass and Hitt, 1973). Geographically, this species occurs in the lower Ochlockonee and lower Suwannee River systems. The lower Suwannee River system includes the Santa Fe and Ichatucknee Rivers (Bass and Hitt, 1973). The species is not known to occur in the study area and, therefore, is not considered a potential inhabitant of the area.

2.7.5.2.6 Plants --

Among the plants of the study area (Appendix D), only the rare and endangered plants listed by USDI and the Florida Committee on Rare and Endangered Plants and Animals (FCREPA), whose ranges are partially found in north central Florida, are to be considered. The following data is primarily based on the work conducted in the adjoining Osceola National

Forest (NFWL, 1978) since the present study was conducted largely during winter months, a time when many herbaceous plants cannot be observed and most flowering plants cannot be adquately identified.

Andropogon arctatus

Andropogon arctatus has recently been proposed for endangered status by the USFWS. Very little is currenly known concerning the distribution, ecology or taxonomic status which apparently occurs in pine flatwoods west of the Suwannee River. A. arctatus was not encountered in the Osceola National Forest (NFWL, 1978). It is not known whether the plant may exist in the flatwoods area surrounding the proposed plant site.

Balduina atropurpurea

Balduina atropurpurea has been proposed for endangered status by USFWS (1976) and was protected as an endangered species in Georgia until 1977. The plant is found along seepages, within bogs (probably bayheads and cypress heads) and possibly along the margins of bottomland hardwood stands (NFWL, 1978). During the Osceola National Forest Study, B. uniflora and B. angustifolia were the only species of the genus found. The plant may exist in roadside ditches within the study area and along the margin of Swift Creek north of U.S. 41.

Paronychia rugelii

Paronychia rugelii var. interior has been proposed for endangered status by the USFWS (1976) and was protected in Georgia until 1977. This herb characteristically occurs within the high pineland community, although it was not found in the Osceola National Forest (NFWL, 1978). The absence of this habitat on the proposed plant site and the change of high pineland to agricultural areas within the study area precludes a high possibility of the plant being found.

Tinum westii

Tinum westii has been proposed for endangered status by the USFWS (1976) and listed as rare by FCREPA (Layne, 1976a). The herb appears to be found primarily around ponds and swamps within the pine flatwoods community. The species is known from the Appalachicola region of Florida as well as from Baker County, Florida (NFWL, 1978). The potential of the plant to occur within the study area appears to be high, due to the numerous cypress and bayhead areas.

Salix floridana

Salix floridana has been proposed for endangered status by the USFWS (1976) and has been protected in Georgia since 1975. FCREPA (Layne, 1976a) considers this small tree as rare. Florida willow occurs on the banks of small streams in calcareous hammocks. It is possible that Florida willow grows along Swift Creek along the stream bank in the lower and mid-creek region.

Litsea aestivalis

Litsea aestivalis is currently under review for threatened status by the USFWS and is protected as a threatened species in Georgia. FCREPA

(Layne, 1976a) lists pond spice as rare. In Florida, this species is known from Clay, Columbia, Dixie, Levy, Marion and Taylor Counties (NFWL, 1978). The Columbia County locality located on the east side of the Suwannee River between Deep Creek and Robinson Branch. Pond spice is found along the margins of cypress swamps and, therefore, may be found within the study area.

Hartwrightia floridana

Hartwrightia floridana has been proposed for endangered status by the USFWS and is listed in Georgia as threatened and considered rare by FCREPA (Layne, 1976a). It has been collected at the margin of a cypress-blackgum swamp along the southern border of the Osceola National Forest (NFWL, 1978). It prefers grassy margins of cypress heads in pine flatwoods communities and, therefore, the species is probably found within the study area.

Pieris phillyreifolia

Pieris phillyreifolia is currently under review by the USFWS for threatened status and was protected in Georgia until 1977. Climbing heath is a plant of cypress heads and swamps. It was observed in the Osceola National Forest (NFWL, 1978) and in the study area during a previous study (LaMoreaux and Breedlove, 1977).

Rhapidophyllum hystrix

Rhapidophyllum hystrix is currently being considered as threatened by the USFWS and FCREPA (Layne, 1976a) considers it as threatened due to its spotty distribution. Needle palm grows on hummocks in bayheads, as well as in hammocks on river bluffs of calcareous origin (NFWL, 1978). It has been observed along the Suwannee River within a hammock of white oak, Southern magnolia, swamp chestnut oak, and hickory (NFWL, 1978). Must of the vegetation along Swift Creek in the mid and lower creek regions is similar. The probability of occurrence within the study area is, therefore, ranked as high.

Peltandra sagittaefolia

Peltandra sagittaefolia is proposed for threatened status by the USFWS (1975) and is listed as rare by FCREPA (Layne, 1976a). Spoon flower is associated with boggy, acidic habitats including bogs, bayheads and ditch bottoms. It has been observed in the Osceola National Forest at Impassable Bay (NFWL, 1978). The probability of occurrence is, therefore, ranked as likely within the study area, particularly in Swift Creek Swamp, Bee Haven Bay and other wetland areas.

Ctenium floridanum

Ctenium floridanum has been proposed as threatened by the USFWS (1975) and was protected in Georgia until 1977. It is found within the flatwoods community in areas that are open and frequently flooded (NWFL, 1978). It has not been found in the Osceola National Forest but was observed near Lake City, Florida during the late nineteenth centruy. It may presently occur within the study area.

Sarracenia psittacina

Sarracenia psittacina is currently under review by the USFWS for threatened status (1975) and is protected in Georgia. It has been observed in

Georgia within the Withlacoochee watershed, but appears to be absent from the Okefenokee Swamp and adjoining flatwoods to the west and south (NFWL, 1978). It was not encountered in the Osceola National Forest (NFWL, 1978) and, probably is not found within the study area.

Sphenostigma coelestinum

Spehnostigma coelestinum has been proposed as threatened by the USFWS (1975) and is listed as rare by FCREPA Layne, 1976a). It has been observed 16 km east of the Osceola National Forest (NFWL, 1978). The species is apparently limited to the pine flatwoods community and, therefore, may be found within the study area.

Verbesina heterophylla

Verbesina heterophylla is currently under review for threatened status by the USFWS (1975). It occurs chiefly in the high pineland habitat (NFWL, 1978). Because this habitat has primarily been used as agricultural areas within the study area, it is doubtful that it exists in the area.

Asclepias viridula

Asclepias viridula is currently under review by the USFWS (1975). It is apparently restricted to the longleaf pine phase of the flatwoods community. It has been observed in northern Florida near the Osceola National Forest in Bradford and Baker Counties. Some longleaf pine flatwoods occur in the study area, and thus, the species may be expected to occur within this area.

Carex chapmanii

Carex chapmanii is currently under review by the USFWS as a proposed threatened species. This species typically occupies low-lying hardwood hammocks in northern Florida and has been observed in Columbia County. It has not been observed in Osceola National Forest (NFWL, 1978). Within the study area, it is possible that *C. chapmanii* may exist along Swift Creek.

Pinckneya bracteata

Pinckneya bracteata is under review by USFWS as a threatened species and is listed as rare by FCREPA (Layne, 1976a). Fever tree is a plant associated with creek swamp hammocks characterized by acidic, sandy soils (NWFL, 1978). There is a moderate probability that fever tree may exist in Swift Creek Swamp and Bee Haven Bay.

Zephranthes treatiae

Zephranthes treatiae is under review by the USFWS (1975) as a threatened species. This atamasco lily appears to occupy a variety of habitats and was found along Deep Creek in the Osceola National Forest (NWFL, 1978). It is highly likely that *Z. treatiae* occurs along the Swift Creek and along the margins of Swift Creek Swamp and Bee Haven Bay.

Rhododendum chapmanii

Rhododendum chapmanii is listed as rare by the FCREPA (Layne, 1976a). This species has been observed along Swift Creek, Rocky Creek, Roaring Creek, Camps Branch and the Suwannee River. It has been observed in pine flatwoods community within the study area.

Ulmus crassifolia

Ulmus crassifolia is listed as rare by FCREPA (Layne, 1976a). It has been found along the Suwannee River in mesic hammocks located on limestone in Suwannee and Gilchrist Counties (NWFL, 1978). It is possible that cedar elm exists along the lower reaches of Swift Creek and along the Suwannee River in the vicinity of Swift Creek since habitat requirements are met.

2.7.5.3 Migratory Wildlife and Habitat

Only 13% of 235 birds suspected to occur in the study area are non-migratory. The other 87 percent are either transients through the area. winter residents, summer residents or local non-migratory sub-species that share the area with northern migratory sub-species during the winter.

The natural habitats found in the study area mainly provide wintering or transient habitat to field and woodland birds. Very little open aquatic habitat naturally occurs in this area. The grassy wetland portions of Bee Haven Bay provide some habitat for migrant waterfowl and a few other swampy areas provide seasonal habitats for aquatic wildlife. By far, the largest amount of open water habitat is man-made. The mined areas, settling areas and, to a lesser extent, farm ponds, provide habitat for a large number of aquatic birds. An estimated 87 species would not be found in the study area if these man-made ponds were absent. Additional species would be found in lower numbers than they presently occur in the area if these man-made habitats were absent.

In addition to birds, one migratory mammal, the Hoary Bat, passes through the study area. Several fish found in the study area live in freshwater but return to saltwater to breed: Hog Choaker, American Eel, and possibly the Striped Mullet.

The habitats found in the study area are for the most part altered by man's activities (farming, roads, forestry management, mining and housing). The natural habitats that still occur are mostly small tracks of woodland along the creek and river systems. These areas are separated and scattered by field roads and pine plantations. An exception to this is the large relatively undisturbed Bee Haven Bay, a track of bayhead and freshwater marsh north of the Swift Creek Mine Site. This area, owing to its large size, provides a large track of wintering habitat for migratory birds.

2.7.5.4 Wildlife Benefits of the Area to Man

Wildlife directly benefits man by providing consumable (hunting, fur trapping, and fishing) and non-consumable (nature study, aesthetics) sources of recreation. Although there is no public game management area within five miles of the site, private hunting is allowed on much of the commercially-owned forest and trapping was observed along Swift Creek. Records of hunting pressure and harvest in these areas are not compiled; however, game population estimates for the Cypress Creek Wildlife Management Area, six miles northwest of the site, are comparable to similar habitats within the study area (Steve Stafford, FGFWFC, personal communication).

The Cypress Creek Wildlife Management Area comprises 25,972 acres and consists of approximately 70% pine-palmetto flatwoods, 25% cypress-gum swamp and 10% hardwood hammock. Game population estimates for the entire tract indicate approximately 550 deer (1 per 47 acres), 50 turkeys (1 per 519 acres) and 140 hogs (1 per 187 acres). Squirrel populations are rated as fair (Steve Stafford, FGFWFC, personal communication). Hunting pressure for the combined 1976-77 and 1977-78 seasons average 4,662 man-days.

Waterfowl usage of local clay settling ponds is considerable and hunting is permitted by Occidental on some of these areas each year. Duck hunting results from five hunting days during the 1976-77 season indicate a net return of 3 to 4 ducks per hunter per day (J. Wester, Occidental Chemical Company, personal communication). These settling areas also attract non-consumptive use by organized groups such as the Audubon Society, which tours the phosphate mining area each year.

The existence of a qualitatively good sport fishery for the Suwannee River has been demonstrated (Bass, 1971), though use of the resource is only moderate and consists primarily of local residents. Fishing success depends on water level with the greatest catch per unit effort at low water. Redbreast sunfish dominate the catch during periods of low water which catfish predominate during periods of high water. The larger streams in the area may support some additional fishing activity but no such use was observed along Swift Creek during the field surveys.

in the more elevated areas near Jasper and in better drained locations near the Suwannee River and the lower portions of Camps Branch and Swift Creek (Figure 2.7-6). Specific crops within the area change from year to year, though production characteristics and crop percentages should largely reflect those of the county as a whole.

About 260,000 acres (79 percent of total county land use) of the county is in forest (R. Andrews, Hamilton County Agricultural Agent, personal communication), 57 percent of which is ownedindustry (McClure, 1970). All but about 0.5 percent is classified as commercial (McClure, 1970). About 60 percent of the forest land is in longleaf or slash pine, most of which is intensely managed for pulpwood production (Section 2.7.1.1.2). Site class values for the county range from three to five, which is typical of the northeast Florida region and indicates an average productivity of from 50 to 85 cubic feet per acre annually. Timber harvest during 1977 consisted of 58,232 cords (R. Andrews, Hamilton County Agricultural Agent, personel communication).

Forest land within five miles of the site is largely industry owned (Section 2.7.1.1.2). Of the 40,707 acres of forest in the area, 53 percent is in pineland, most of which (about 90 percent) is intensely managed for pulpwood production on about a 25 year rotation. Much of the pineland in the vicinity of the site has recently been cleared.

2.7.6 TRENDS IN THE AREA

County-wide, the land devoted to agriculture is stable with the exception of normal year to year changes associated with market variations and crop rotation needs. All significant areas in the county suitable for productive agriculture have been developed (R. Andrews, Hamilton County Agricultural Agent), personal communication), and no expansion of the agricultural base in the area of concern is on-going or anticipated.

Similarly, the amount of forest land in the county is not growing, as indicated by the stable agriculture base and population; but the volume of all marketable sawtimber types has increased from 1 to 3 percent annually since 1970 (Friensehner, 1977). In terms of total growing stock (which includes pulpwood types), net growth for the county during the same interval was 112 percent of growing stock removal, but pine removals actually exceeded growth by 15 percent. The recent harvest of pineland timber on and in the vicinity of the proposed chemical plant probably contributed to this net loss of pine gorwing stock. In general, the trend in forestry is apparently toward increasing the timber volume on existing forest land through more intensive timber management. This is and will continue to be reflected at the local level by an increase in site prepared and planted stands at the expense of naturally regenerated and maintained forest communities.

The most significant land-use trend in the area, however, is the growth of phosphate mining and related activities. During the operational life of the proposed chemical plant, most of the land in the vicinity of the site will be cleared and mined. Existing land uses in these areas will, of course, be superseded and replaced by the early successional or pasture type communities which evolve soon after reclamation. Thus, during plant operation, forestry and agriculture land uses in the area of concern will decline and successional post-mining communities will increase.

2.7.7 SUMMARY: AN ECOSYSTEM OVERVIEW

An ecosystem flow diagram has been developed showing the principal components and interrelationships of the native system within five miles of the plant site, and the relationship of this ecosystem to both the existing cultural setting and adjacent or linked systems not within the area (Figure 2.7-22). The diagram presents only the major material or information exchanges, or those of greatest interest, and is not intended as a complete system model.

The local ecosystem is composed of both terrestrial and aquatic communities interacting between themselves and the local physical setting through pathways of energy flow and material or information exchange. Topography and rainfall patterns are shown to be controlling features in the native system, directing and modifying all of the pathways between the biotic components and the local nutrient pool. For example, soil nutrients available to terrestrial vegetation are determined by topographic setting and drainage, with drainage intensity being directly related to rainfall (Section 2.7.1.2). Biological material, however, may only re-enter the nutrient pool after passing through the decomposition components, which consists of the soil microflora and detrivorous aquatic life.

Transport of materials between the local system and adjacent or linked systems is shown to consist primarily of terrestrial animal exchanges (controlled by the vegetative community characteristics), exchanges of aquatic animal life between the local aquatic subsystem and the Suwannee River, and downstream transport of detritus and nutrients into the Suwannee River. Downstream transport is shown to be directly related to the vegetation characteristics of the local aquatic communities and the local topographic setting and rainfall patterns.

Transport of material between the local ecosystem and the cultural system consists of a loss of terrestrial vegetation to agriculture, forestry and mining, the loss of aquatic community vegetation to mining, the subsequent restoration of terrestrial vegetation by reforestation, and restoration of both terrestrial and aquatic plant communities by reclamation. Agriculture, forestry, mining and reclamation, and the Suwannee River Chemical Complex are also shown as contributing to the local nutrient pool.

Control pathways between the local cultural developments and the native ecosystem includes the SRCC's influence on nutrient uptake by aquatic vegetation and the influence of stream modifications on the composition of aquatic vegetation. Stream modifications are also shown affecting the pathway whereby topographic features control nutrient uptake by aquatic vegetation.

Table 2.7-1 Fishes of the Suwannee River System.

Scientific Name/Common Name	Occurrence in Study Area
Acipenser oxyrhynchus Atlantic sturgeon	--
Amia calva Bowfin	X
Lepisosteus osseus Longnose gar	X
Lepisosteus platyrhincus Florida gar	X
Alosa alabamae Alabama shad	--
Brevoortia patronus Largescale menhaden	--
Brevoortia smithi Finescale menhaden	--
Dorosoma cepedianum Gizzard shad	S
Dorosoma petenense Threadfin shad	--
Esox americanus Redfin pickerel	*
Esox niger Chain pickerel	*
Umbra pygmaea Eastern mudminnow	X
Erimyzon sucetta Lake chubsucker	S
Minytrema melanops Spotted sucker	X
Notemigonus crysoleucas Golden shiner	*

Table 2.7-1 (Continued)

Scientific Name/Common Name	Occurrence in Study Area
Notropis chalybaeus Ironcolor shiner	S
Notropis harperi Redeye chub	X
Notropis hypselopterus Sailfin shiner	*
Notropis leedsi Ohoopee shiner	*
Notropis petersoni Coastal shiner	*
Notropis maculatus Taillight shiner	S
Notropis texanus Weed shiner	*
Notropis venustus Blacktail shiner	*
Notropis emiliae Pugnose minnow	X
Ictalurus catus White catfish	X
Ictalurus natalis Yellow bullhead	*
Ictalurus nebulosus Brown bullhead	X
Ictalurus punctatus Channel catfish	X
Ictalurus serracanthus Spotted bullhead	X

Table 2.7-1 (Continued)

Scientific Name/Common Name	Occurrence in Study Area
Noturus gyrinus Tadpole madtom	X
Noturus leptacanthus Speckled madtom	X
Anguilla rostrata American eel	X
Strongylura marina Atlantic needlefish	--
Fundulus chrysotus Golden topminnow	S
Fundulus cingulatus Banded topminnow	X
Fundulus lineolatus Lined topminnow	*
Fundulus seminolis Seminole killifish	--
Jordanella floridae Flagfish	--
Leptolucania ommata Pygmy killifish	X
Lucania goodei Bluefin killifish	S
Gambusia affinis Mosquitofish	*
Heterandria formosa Least killifish	*
Poecilia latipinna Sailfin molly	S
Labidesthes sicculus Brook silverside	*

Table 2.7-1 (Continued)

Scientific Name/Common Name	Occurrence in Study Area
Menidia beryllina Tidewater silverside	--
Aphredoderus sayanus Pirate perch	*
Mugil cephalus Striped mullet	S
Acantharchus pomotis Mud sunfish	X
Centrarchus macropterus Flier	*
Elassoma evergladei Everglades pygmy sunfish	*
Elassoma okefenokee Okefenokee pygmy sunfish	X
Elassoma zonatum Banded pygmy sunfish	X
Enneacanthus chaetodon Blackbanded sunfish	--
Enneacanthus gloriosus Bluespotted sunfish	*
Enneacanthus obesus Banded sunfish	*
Lepomis auritus Redbreast sunfish	*
Lepomis gulosus	*
Lepomis macrochirus Bluegill	*
Lepomis marginatus Dollar sunfish	X

Table 2.7-1 (Continued)

Scientific Name/Common Name	Occurrence in Study Area
Lepomis microlophus Redear sunfish	X
Lepomis punctatus Spotted sunfish	*
Micropterus notius Suwannee bass	--
Micropterus salmoides Largemouth bass	*
Pomoxis nigromaculatus Black crappie	S
Etheostoma edwini Brown darter	X
Etheostoma fusiforme Swamp darter	X
Percina nigrofasciata Blackbanded darter	*
Trinectes maculatus Hogchoker	X
Notropis cummingsae Dusky shiner	XX
Notropis welaka Bluenose shiner	XX
Ictalurus brunneus Snail bullhead	XX
Cyprinodon hubbsi Lake Eustis pupfish	XX
Lucania parva Rainwater killifish	XX
Etheostoma olmstedi Tesselated darter	XX

Table 2.7-1 (Continued)

Scientific Name/Common Name	Occurrence in Study Area
Menidia beryllina Tidewater silverside	--
Aphredoderus sayanus Pirate perch	*
Mugil cephalus Striped mullet	S
Acantharchus pomotis Mud sunfish	X
Centrarchus macropterus Flier	*
Elassoma evergladei Everglades pygmy sunfish	*
Elassoma okefenokee Okefenokee pygmy sunfish	X
Elassoma zonatum Banded pygmy sunfish	X
Enneacanthus chaetodon Blackbanded sunfish	--
Enneacanthus gloriosus Bluespotted sunfish	*
Enneacanthus obesus Banded sunfish	*
Lepomis auritus Redbreast sunfish	*
Lepomis gulosus	*
Lepomis macrochirus Bluegill	*
Lepomis marginatus Dollar sunfish	X

Table 2.7-2 Acreage Determinations of Five Miles Area Surrounding Occidental's Proposed Swift Creek Chemical Complex.

Community	Acres	Percent of Total
Pinelands	∿ 21,610	43%
Hardwood Swamp	∿ 7,036	14%
Agricultural	∿ 6,031	12%
Cypress	∿ 6,031	12%
Bayhead	∿ 3,015	6%
Southern Mixed Hardwoods	∿ 3,015	6%
Settling Areas	∿ 1,507	3%
Mined Areas	∿ 1,507	3%
Tailings	> 170	> 1%
Reclaimed	> 170	> 1%
Open Water	> 170	> 1%

Table 2.7-1 (Continued)

Scientific Name/Common Name	Occurrence in Study Area
Syngnathus scovelli Gulf pipefish	X
Lutjanus griseus Gray snapper	X
Paralichthys lethostigma Southern flounder	X

+Carter, Gilbert. Personal Communication. Florida State Museum.

Legend

*	Encountered in present study.
X	Known to occur in study area.
S	Potentially may occur in study area.
--	Not expected in study area.
XX	Known to occur in neighboring St. Johns River drainage.

Reproduced from best available copy.

Table 2.7-3 (Continued)

Common Name/Scientific Name	Pine Flatwoods	High Pinelands-Sandhills	Southern Mixed Hardwoods	Bayheads	Mixed Hardwood Swamps	Cypress-heads	Agricultural Land	Aquatic Areas	Remarks
Southeastern Weasel* (*Mustela frenata olivacea*)	R	R	R	R	R	R	R	R	
Southern Mink (*Mustela vison mink*)					R			R	
River Otter* (*Lutra canadensis*)					0			C	
Spotted Skunk* (*Spilogale putorius*)	0	0	0						
Striped Skunk* (*Mephitis mephitis*)	0	C	0						
Gray Fox* (*Urocyon cinereoargenteus*)	0	0	0		R		0		
Florida Panther (*Felis concolor coryi*)	R	R	R	R	R	R		R	Speculative, based on persistant but unverified sightings.
Bobcat* (*Lynx rufus*)	0	0	0		0				
Florida Black Bear* (*Ursus americanus floridanus*)	R	R	R	R	R	R			

Table 2.7-3 (Continued)

Common Name/Scientific Name	Pine Flatwoods	High Pinelands-Sandhills	Southern Mixed Hardwoods	Bayheads	Mixed Hardwood Swamps	Cypress-heads	Agricultural Lands	Aquatic Areas	Remarks
Norway Rat (Rattus norvegicus)							0		
Black Rat (Rattus rattus)							0		
Beaver* (Castor canadensis)					0		C		
Nutria (Myocastor coypus)								0	Introduced species, speculative in area.
Southern Flying Squirrel* (Glaucomys volans)	0	0	C						
Eastern Gray Squirrel* (Sciurus carolinensis)	0	0	C		0	C	C		
Sherman's Fox Squirrel (Sciurus niger shermani)	0	0	0				R		
Eastern Cottontail* (Sylvilagus floridanus)	0	C	0				C		
Marsh Rabbit* (Sylvilagus palustris)	0	R	0					C	
Nine-banded Armadillo* (Dasypus novemcinctus)	C	0	C		0		A	0	
Raccoon* (Procyon lotor)			C	A	A			C	

Table 2.7-3 (Continued)

Common Name/Scientific Name	Pine Flatwoods	High Pinelands-Sandhills	Southern Mixed Hardwoods	Bayheads	Mixed Hardwood Swamps	Cypress-heads	Agricultural Lands	Aquatic Areas	Remarks
Old Field Mouse* (Peromyscus polionotus)	R	C	O				O		
Cotton Mouse* (Peromyscus gossypinus)	O	C	C	C	A	C	O	O	On edges of aquatic areas.
Florida Mouse (Peromyscus floridanus)	R	R	R						Speculative in area, known from Fulmouth, Suwannee Co.
Golden Mouse* (Ochrotomys nuttalli)	O	O	C	C					
Rice Rat* (Oryzomys palustris)			O	O	C	O		C	Around edges of aquatic areas.
Eastern Woodrat (Neotoma floridana)	R		O	O	O	O			
Hispid Cotton Rat* (Sigmodon hispidus)	A	C	O				A	O	On edges of aquatic areas.
Pine Vole (Pitymys pinetorum)	O	O							
Round-tailed Muskrat (Neofiber alleni)								O	In areas of thick maiden cane.
House Mouse* (Mus musculus)							C		

Table 2.7-3 (Continued)

Common Name/Scientific Name	Pine Flatwoods	High Pinelands-Sandhills	Southern Mixed Hardwoods	Bayheads	Mixed Hardwood Swamps	Cypress-heads	Agricultural Lands	Aquatic Areas	Remarks
Yellow Bat* (Lasiurus intermedius)		0	0				R		Present in spring, summer and fall.
Red Bat* (Lasiurus borealis)			R		C		R	C	May feed around street-lights.
Seminole Bat* (Lasiurus seminolus)			R		0			0	Spring runs and rivers in spring, summer and fall.
Hoary Bat* (Lasiurus cinereus cinereus)					R			R	Migrant in spring and fall.
Big Brown Bat* (Eptesicus fuscus)							R		
Brazilian Free-tailed Bat (Tadarida brasiliensis)			R				R	0	Feeds in aquatic areas. May roost in buildings.
Evening Bat (Nycticeius humeralis)			R		C			C	Spring runs and rivers in spring, summer and fall.
Eastern Big-eared Bat (Plecotus rafinesquii)			R						
Southeastern Pocket Gopher* (Geomys pinetus)	0	C	0				C		
Eastern Harvest Mouse* (Reithrodontomys humulis)	0	0	0						

Table 2.7-3 (Continued)

Common Name/Scientific Name	Pine Flatwoods	High Pinelands-Sandhills	Southern Mixed Hardwoods	Bayheads	Mixed Hardwood Swamps	Cypress-heads	Agricultural Lands	Aquatic Areas	Remarks
White-tailed Deer* (*Odocoileus virginianus*)	C	C	0		0		0	0	Marsh areas in aquatic habitat.
Feral Hog* (*Sus scrofa*)	C	0	0		0		0	0	Marsh areas in aquatic habitat.
Manatee (*Trichechus manatus*)								R	Speculative in area, known infrequently above Branford on Suwannee River.

Legend
Relative Abundance
A = Abundant
C = Common
0 = Occasional
R = Rare

* Confirmed in the study area by actual observation, museum specimen, and/or literature.

Table 2.7-4 Probability of Occurrence of Expected Mammal Species in Study Area on Existing Mined Lands

Common Name/Scientific Name	Unreclaimed Mine	Active Settling Area	Inactive Settling Area	Sand-tailings Area	Reclaimed Area	Dike, Roads Buildings	Remarks
Virginia Opossum* (Didelphis marsupialis)	C	C	C	C	C	C	
Least Shrew* (Cryptotis parva)	0	0	0	N	0	0	
Short-tailed Shrew* (Blarina brevecauda)	0	0	0	N	0	0	
Southeastern Shrew (Sorex longirostris longirostris)	N	N	N	N	N	N	
Southeastern Mole* (Scalopus aquaticus)	N	N	N	R	0	0	
Gray Bat (Myotis grisescens)	N	N	N	N	N	N	
Southeastern Myotis (Myotis austroriparius)	N	0	0	N	R	N	
Eastern Pipistrel (Pipistrellus subflavus)	N	0	0	N	R	N	
Yellow Bat* (Lasiurus intermedius)	N	0	0	N	R	N	
Red Bat* (Lasiurus borealis)	N	0	0	N	R	N	
Seminole Bat (Lasiurus seminolus)	N	0	0	N	R	N	

Table 2.7 -4 (Continued)

Common Name/Scientific Name	Unreclaimed Mine	Active Settling Area	Inactive Settling Area	Sand-tailings Area	Reclaimed Area	Dike, Roads Buildings	Remarks
Hoary Bat (*Lasiurus cinereus cinereus*)	N	R	R	N	R	N	
Big Brown Bat (*Eptesicus fuscus*)	N	0	0	N	R	N	
Brazilian Free-tailed Bat (*Tadarida brasiliensis*)	N	0	0	N	R	N	
Evening Bat (*Nycticeius humeralis*)	N	0	0	N	R	N	
Eastern Big-eared Bat (*Plecotus rafinesquii*)	N	R	R	N	R	N	
Eastern Harvest Mouse (*Reithrodontomys humulis*)	N	N	N	N	N	N	
Old Field Mouse* (*Peromyscus polionotus*)	N	N	N	0	0	R	
Cotton Mouse* (*Peromyscus gossypinus*)	0	C	R	N	0	N	
Florida Mouse (*Peromyscus floridanus*)	N	N	N	N	N	N	Inappropriate habitat.
Golden Mouse (*Ochrotomys nuttalli*)	N	N	N	N	N	N	Inappropriate vegetation.
Rice Rat* (*Oryzomys palustris*)	0	C	C	N	0	N	Inappropriate vegetation.

Table 2.7 -4 (Continued)

Common Name/Scientific Name	Unreclaimed Mine	Active Settling Area	Inactive Settling Area	Sand-tailings Area	Reclaimed Area	Dike, Roads Buildings	Remarks
Eastern Woodrat (*Neotoma floridana*)	N	N	N	N	N	N	
Hispid Cotton Rat* (*Sigmodon hispidus*)	C	C	C	R	C	C	
Pine Vole (*Pitymys pinetorum*)	N	N	N	N	N	N	
Round-tailed Muskrat (*Neofiber alleni*)	N	N	N	N	N	N	Settling area sides are too steep.
House Mouse* (*Mus musculus*)	0	0	0	N	0	0	Man-associated.
Norway Rat (*Rattus norvegicus*)	0	0	0	N	0	0	Man-associated.
Black Rat (*Rattus rattus*)	0	0	0	N	0	0	Man-associated.
Beaver (*Castor canadensis*)	N	N	N	N	N	N	
Southeastern Pocket Gopher (*Geomys pinetus*)	N	N	N	R	0	N	
Natria (*Myocastor coypus*)	N	R	N	N	N	N	

Table 2.7-4 (Continued)

Common Name/Scientific Name	Unreclaimed Mine	Active Settling Area	Inactive Settling Area	Sand-tailings Area	Reclaimed Area	Dike, Roads Buildings	Remarks
Southern Flying Squirrel (*Glaucomys volans*)	N	N	N	N	N	N	
Eastern Gray Squirrel (*Sciurus carolinensis*)	N	N	N	N	N	N	
Sherman's Fox Squirrel (*Sciurus niger shermani*)	N	N	N	N	N	N	
Eastern Cottontail* (*Sylvilagus floridanus*)	O	O	O	O	C	O	
Marsh Rabbit (*Sylvilagus palustris*)	N	O	O	N	O	N	
Nine-banded Armadillo* (*Dasypus novemcinctus*)	C	C	C	C	C	C	
Raccoon* (*Procyon lotor*)	C	C	C	C	C	C	
Southeastern Weasel* (*Mustela frenata olivacea*)	R	R	R	R	R	R	
Southern Mink (*Mustela vison mink*)	N	R	R	N	N	N	
River Otter* (*Lutra canadensis*)	N	O	O	N	N	N	
Spotted Skunk (*Spilogale putorius*)	O	N	O	N	O	R	

Table 2.7-4 (Continued)

Common Name/Scientific Name	Unreclaimed Mine	Active Settling Area	Inactive Settling Area	Sand-tailings Area	Reclaimed Area	Dike, Roads Buildings	Remarks
Striped Skunk* (*Mephitis mephitis*)	O	N	O	N	O	R	
Gray Fox* (*Urocyon cinereoargenteus*)	R	R	R	R	R	R	
Florida Panther (*Felis concolor coryi*)	N	N	N	N	N	N	
Bobcat* (*Lynx rufus*)	R	R	O	R	R	R	
Florida Black Bear (*Ursus americanus floridanus*)	N	N	N	N	N	N	
White-tailed Deer* (*Odocoileus virginianus*)	N	N	R	R	R	N	
Feral Hog* (*Sus scrofa*)	R	N	N	N	R	R	
Manatee (*Trichechus manatus*)	N	N	N	N	N	N	

Legend

C = Common occurrence
O = Occasional occurrence
R = Rare occurence
N = Would most likely not occur

*Confirmed probability of occurrence.

Table 2.7-5 An Expected Bird Species List for the Area within Five Miles of the Proposed Swift Creek Chemical Complex

Common Name/Scientific Name	Habitat	Status	Season of Occurence
*Common Loon (*Gavia immer*)	ML(a-d)	R	F,W,S
*Horned Grebe (*Podiceps auritus*)	ML(a-d)	U	W
*Pied-billed Grebe (*Podilymbus podiceps*)	ML(a-e)	A	All
*White Pelican (*Pelecanus erythrorhyuchos*)	ML(a-d)	R	F,W,S
*Double-crested Cormorant (*Phalacrocorax auritus*)	ML(a-e)	A	All
*Anhinga (*Anhinga anhinga*)	ML(a-e), MHS, BH	A	All
*Great Blue Heron (*Ardea herodias*)	ML(a-e), CH, MHS	A	All
*Green Heron (*Butorides striatus*)	ML(a-e), MHS, BH	C	All
*Little Blue Heron (*Florida caerulea*)	ML(a-e), MHS, CH, BH	A	All
*Cattle Egret (*Bubulcus ibis*)	ML(a-f), AL, PF	A	All
*Great Egret (*Casmerodius albus*)	ML(a-e), MHS, CH, BH	A	All
*Snowy Egret (*Egretta thula*)	ML(a-e) BH, CH, MHS	C	All
*Louisiana Heron (*Hydranassa tricolor*)	ML(a-e), MHS,	R	All
*Black-crowned Night Heron (*Nycticorax nycticorax*)	ML(a-e), MHS	C	All
*Yellow-crowned Night Heron (*Nyctanassa violacca*)	ML(a-e), MHS	R	All
*American Bittern (*Botaurus lentiginosus*)	ML(a-e)	U	F,W,S

Table 2.7-5 (Continued)

Common Name/Scientific Name	Habitat	Status	Season of Occurence
*Least Bittern (Ixobrychus exilis)	ML(a-e)	C	S,Sm,F
*Wood Stork (Mycteria americana)	ML(a-e), BH, CH, MHS	C	All
Glossy Ibis (Plegadis falcinellus)	ML(a-e)	R	All
*White Ibis (Eudocimus albus)	ML(a-e), BH, CH, MHS	C	All
*Canada Goose (Branta canadensis)	ML(a-d)	U	All (introduced)
*Snow Goose (Cheu caerulescens)	ML(a-d)	R	F,W,S
Fulvous Whistling Duck (Dendrocygna bicolor)	ML(a-d)	VR	All
*Mallard (Anas platyrhynchos)	ML(a-d)	U	All
*Black Duck (Anas rubripes)	ML(a-d)	R	F,W,S
*Gadwall (Anas strepera)	ML(a-d)	C	F,W,S
*Pintail (Anas acuta)	ML(a-d)	C	F,W,S
*Common Teal (Anas crecca)	ML(a-d)	A	F,W,S
*Blue-winged Teal (Anas discors)	ML(a-d)	A	F,W,S
*American Wigeon (Anas americana)	ML(a-d)	C	F,W,S
*Northern Shoveler (Anas clypeata)	ML(a-d)	A	F,W,S
*Wood Duck (Aix sponsa)	ML(a-e), MHS	C	All
*Redhead (Aythya americana)	ML(a-d)	U	F,W,S

Table 2.7-5 (Continued)

Common Name/Scientific Name	Habitat	Status	Season of Occurence
*Ring-necked Duck (_Aythya_ _collaris_)	ML(a-e)	A	F,W,S
*Canvasback (_Aythya_ _valisineria_)	ML(a-d)	U	F,W,S
*Lesser Scaup (_Aythya_ _affinis_)	ML(a-d)	R	F,W,S
*Common Goldeneye (_Bucephala_ _clangula_)	ML(a-d)	R	F,W,S
*Bufflehead (_Bucephala_ _albeola_)	ML(a-d)	U	F,W,S
*Ruddy Duck (_Oxyura_ _jamaicensis_)	ML(a-d)	A	F,W,S
*Red-breasted Merganser (_Mergus_ _serrator_)	ML(a-d)	R	F,W,S
*Hooded Merganser (_Lophodytes_ _cucullatus_)	ML(a-e)	A (F,W,S) VR (Sm)	All
*Turkey Vulture (_Cathartes_ _aura_)	All	C	All
*Black Vulture (_Corygyps_ _atratus_)	All	C	All
Swallow-tail Kite (_Elanoides_ _forticatus_)	MHS	R	Sm
Mississippi Kite (_Ictinia_ _mississippiensis_)	SMH, MHS	R	S,Sm
*Sharp-shinned Hawk (_Accipiter_ _striatus_)	All	C	F,W,S
*Cooper's Hawk (_Accipiter_ _cooperii_)	All	R	All
*Red-tailed Hawk (_Buteo_ _jamaicensis_)	PF, SH, AL. ML(a-f)	A (F,W,S) C (Sm)	All
*Red-shouldered Hawk (_Buteo_ _lineatus_)	All	A	All
Broad-winged Hawk (_Buteo_ _platypterus_)	SMH	U	F,Sm,S

Table 2.7-5 (Continued)

Common Name/Scientific Name	Habitat	Status	Season of Occurence
*Killdeer (*Charadrius vociferus*)	ML(All), AL	C	All
*Black-bellied Plover (*Pluvialis squatarola*)	ML(a,b)	U	S,F
*American Woodcock (*Philohela minor*)	SMH, MHS, AL	U	All
*Common Snipe (*Capella gallinago*)	ML(a-e), AL	C	F,W,S
*Spotted Sandpiper (*Actitis macularia*)	ML(a-e), MHS	U	All
*Solitary Sandpiper (*Tringa solitarius*)	ML(a-e), MHS	U	All
*Greater Yellowlegs (*Tringa melanolenca*)	ML(a-e)	C	All
*Lesser Yellowlegs (*Tringa flavipes*)	ML(a-e)	C	All
Willet (*Catoptrophorus semipalmatus*)	ML(a-e)	VR	All
*Pectoral Sandpiper (*Calidris melanotos*)	ML(a-e)	R	F,W,S
*White-rumped Sandpiper (*Calidris fuscicollis*)	ML(a-e)	R	S
Baird's Sandpiper (*Calidris bairdii*)	ML(a-e)	VR	F,S
*Least Sandpiper (*Calidris minutilla*)	ML(a-e)	A	All
*Semipalmated Sandpiper (*Calidris pusillus*)	ML(a-e)	C	All
*Western Sandpiper (*Calidris mauri*)	ML(a-e)	R	All
Sanderling (*Calidris alba*)	ML(a-e)	R	All
*Dunlin (*Calidris alpina*)	ML(a-e)	VR	All

Table 2.7-5 (Continued)

Common Name/Scientific Name	Habitat	Status	Season of Occurence
Golden Eagle (_Aquila_ _chrysaetos_)	ML(a-d)	VR	W
*Bald Eagle (_Haliaectus_ _leucocephalus_)	ML(a-d)	C	All
Marsh Hawk (_Circus_ _cyaneus_)	AL, PL, ML	C	F,W,S
*Osprey (_Pandion_ _haliaetus_)	ML(a-d)	U	Sm
*Peregrine Falcon (_Falco_ _peregrinus_)	ML(a-d)	VR	F,W,S
Merlin (_Falco_ _columbarius_)	ML(a-d)	VR	F,W,S
*American Kestrel (_Falco_ _sparverius_)	AL, ML(All), PF, SH	A (F,W,S) R (Sm)	All
Turkey (_Meleagris_ _gallopavo_)	SMH, PF, SH, BH	U	All
*Bobwhite (_Colinus_ _virginianus_)	ML(c), PF, SH, AL	C	All
*Sandhill Crane (_Grus_ _canadensis_)	AL, ML(b,c), BH	VR	All
King Rail (_Rallus_ _elegans_)	ML(a,b)	R	All
Virginia Rail (_Rallus_ _limicola_)	ML(a,b)	R	F,W,S
*Sora (_Porzana_ _carolina_)	ML(a-e)	C	F,W,S
*Purple Gallinule (_Porphyrula_ _martinica_)	ML(a-e)	R	S
*Common Gallinule (_Gallinula_ _chloropus_)	ML(a-e)	C	All
*American Coot (_Fulica_ _americana_)	ML(a-e)	A	All
*Semipalmated Plover (_Charadrius_ _semipalmatus_)	ML(a-c)	U	S,Sm,F

Table 2.7-5 (Continued)

Common Name/Scientific Name	Habitat	Status	Season of Occurence
*Long-billed Dowitcher (Limnodromus scolopaceus)	ML(a-e)	U	All
*Stilt Sandpiper (Micropalama himantopus)	ML(a-e)	U	All
Buff-breasted Sandpiper (Tryngites subruficollis)	AL	VR	S,F
American Avocet (Recurvirostra americana)	ML(a-e)	VR	W
*Black-necked Stilt (Himantopus mexicanus)	ML(a-e)	U	Sm
*Herring Gull (Larus argentatus)	ML(a-e), AL	U	F,W,S
*Ring-billed Gull (Larus delewarensis)	ML(a-e), AL	A	F,W,S
*Laughing Gull (Larus atricilla)	ML(a-e)	U	S,Sm
*Bonaparte's Gull (Larus philadelphia)	ML(a-e)	C	F,W,S
Gull-billed Tern (Geochelidon nilotica)	ML(a-e)	R	Sm
*Forster's Tern (Sterna forsteri)	ML(a-e)	C	F,W,S
Common Tern (Sterna hirundo)	ML(a-e)	U	W
*Least Tern (Sterna albifrons)	ML(a-e)	U	Sm
*Caspian Tern (Sterna caspia)	ML(a-e)	U	S,Sm,F
*Black Tern (Chlidonias niger)	ML(a-d)	C	Sm
*Rock Dove (Columba livia)	AL, ML	U	All
*Mourning Dove (Zenaida macroura)	All	A	All

Table 2.7-5 (Continued)

Common Name/Scientific Name	Habitat	Status	Season of Occurence
*Ground Dove (Columbina passerina)	SH, AL, ML(b-e)	U	All
*Yellow-billed Cuckoo (Coccyzus americanus)	SMH, BH, MHS, ML(e)	C	S,Sm,F
Llack-billed Cuckoo (Coccyzus erythropthalmus)	SMH, BH, MHS	R	S,F
Barn Owl (Tyto alba)	PF, SH, SMH AL, ML(a-e)	C	All
Screech Owl (Otus asio)	PF, SH, SMH	C	All
*Great Horned Owl (Bubo virginianus)	PF, SH, SMH, AL, ML(a-e)	C	All
*Barred Owl (Strik varia)	SMH, BH, CH, MHS	C	All
*Chuck-will's-widow (Caprimulgas carolinensis)	SMH, PF, SH	C	S,Sm,F
Whip-poor-will (Caprimulgas vociferus)	SMH, PF, SH	U	S,F
*Common Nighthawk (Chordeiles minor)	SMH, PF, SH, AL, ML(a-e)	A	S,Sm,F
*Chimney Swift (Chaetura pelagica)	SMH, PF, SH, AL, ML(a-e)	C	S,Sm,F
*Ruby-throated Hummingbird (Archilochus colubris)	SMH, ML(b,d,e)	C	S,Sm,F
*Belted Kingfisher (Megaceryle alcyon)	MHS, ML(a-e)	C	All
*Common Flicker (Colaptes auratus)	All	C	All
*Pileated Woodpecker (Dryocopus pileatus)	MHS, SMH, PF, SH, CH, BH	C	All
*Red-bellied Woodpecker (Melanerpes carolinus)	MHS, SMH, PF, SH, CH, BH, ML(a-e)	A	All
Red-headed Woodpecker (Melanerpes erythrocephalus)	SMH, PF	U	All

Table 2.7-5 (Continued)

Common Name/Scientific Name	Habitat	Status	Season of Occurence
*Yellow-bellied Sapsucker (_Sphyrapicus varius_)	SMH, PF, SH	C	F,W,S
*Hairy Woodpecker (_Picoides villosus_)	SMH, PF, MHS, BH	R	All
*Downy Woodpecker (_Picoides pubescens_)	SMH, PF, SH, MHS, BH	C	All
Red-cockaded Woodpecker (_Picoides borealis_)	PF	VR	All
*Eastern Kingbird (_Tyrannus tyrannus_)	ML(a-e), AL, PF, SH	C	S,Sm,F
*Great Crested Flycatcher (_Myiarchus crinitus_)	PF, SH, SMH	A	S,Sm,F
*Eastern Pheobe (_Sayornis phoebe_)	PF, SH, AL, ML(a-e)	A	F,W,S
Acadian Flycatcher (_Empidonax virescens_)	SMH, MHS, BH	C	S,Sm,F
Eastern Wood Pewee (_Contopus virens_)	PF, SH	C	S,Sm,F
*Tree Swallow (_Iridoprocne bicolor_)	AL, ML(a-e), PF	C	F,W,S
Bank Swallow (_Riparia riparia_)	AL, ML(a-e), PF	R	F,S
*Rough-winged Swallow (_Stelgidopteryx ruficollis_)	PF, AL, ML(a-e)	U	S,Sm,F
*Barn Swallow (_Hirundo rustica_)	PL, AL, ML(a-e)	C	S,Sm,F
Cliff Swallow (_Petrochelidon pyrrhonota_)	PF, AL, ML(a-e)	VR	S,Sm,F
*Purple Martin (_Progne subis_)	PF, AL, ML(a-e)	C	S,Sm,F
*Blue Jay (_Cyanocitta cristata_)	PF, SH, SMH, CH, BH, MHS	C	All
*Common Crow (_Corvus brachyrhynchos_)	PF, SH, SMH	A	All

Table 2.7-5 (Continued)

Common Name/Scientific Name	Habitat	Status	Season of Occurence
*Fish Crow (Corvus ossifragus)	PF, AL, ML(a-e)	C	All
*Carolina Chickadee (Parus carolinensis)	PF, SH, SMH	C	All
*Tufted Titmouse (Parus bicolor)	PF, SH, SMH	A	All
White-breasted Nuthatch (Sitta carolinensis)	PF, SH, SMH	VR	W
Red-breasted Nuthatch (Sitta canadensis)	PF, SH, SMH	VR	F,W,S
Brown-headed Nuthatch (Sitta pusilla)	PF, SH	C	All
Brown Creeper (Certhia familiaris)	PF, SH, SMH	VR	F,W,S
*House Wren (Troglodytes aedon)	All	A	F,W,S
Winter Wren (Troglodytes troglodytes)	MHS, SMH	VR	W
*Carolina Wren (Thryothorus ludovicianus)	All	A	All
*Long-billed Marsh Wren (Cistothorus palustris)	ML(a-e), PF, AL	C	All
Short-billed Marsh Wren (Cistothorus platensis)	ML(a-e), PF, AL	U	F,W,S
*Mockingbird (Mimus polyglottus)	PF, SH, AL, ML(a-e)	A	All
*Gray Catbird (Dumetella carolinensis)	PF, SH, SMH, CH, BH, MHS, ML(a-e)	C	All
*Brown Thrasher (Toxostoma rufum)	PF, SH, SMH	A	All
*American Robin (Turdus migratorius)	All	A	F,W,S
Wood Thrush (Hylocichla mustelina)	MHS, SMH	C	All

Table 2.7-5 (Continued)

Common Name/Scientific Name	Habitat	Status	Season of Occurence
Swainson's Warbler (Limnothlypis swainsonii)	MHS	U	S,Sm,F
Worm-eating Warbler (Helmitheros vermivorus)	MHS	U	S,F
Blue-winged Warbler (Vermivora pinus)	SMH	R	F,S
Tennessee Warbler (Vermivora peregrina)	SMH, BH, CH	R	F,W,S
Orange-crowned Warbler (Vermivora celata)	SMH, BH CH	R	F,W,S
*Northern Parula Warbler (Parula americana)	SMH, MHS, PF, SH, BH	C	S,Sm,F
Yellow Warbler (Dendroica petechia)	PF, SH, SMH, BH, MHS	C	S,F
Magnolia Warbler (Dendroica magnolia)	PF, SH, SMH	U	S,F
Cape May Warbler (Dendroica tigrina)	PF, SH, SMH	U	S,F
Black-throated Blue Warbler (Dendroica caerulescens)	SMH	C	S,F
*Yellow-rumped Warbler (Dendroica coronata)	All	A	F,W,S
Black-throated Green Warbler (Dendroica virens)	SMH	U	S,F
Cerulean Warbler (Dendroica cerulea)	MHS, SMH	R	S,F
Blackburnian Warbler (Dendroica fusca)	SMH	U	S,F
*Yellow-throated Warbler (Dendroica dominica)	SMH, MHS	C	All
Chestnut-sided Warbler (Dendroica pensylvanica)	SMH	C	F,S
Bay-breasted Warbler (Dendroica castenea)	SMH	C	F,S

Table 2.7-5 (Continued)

Common Name/Scientific Name	Habitat	Status	Season of Occurence
*Hermit Thrush (Catharus guttata)	PF, SH, SMH	A	F,W,S
Swainson's Thrush (Catharus ustulata)	SMH, MHS, BH	U	F,S
Gray-cheeked Thrush (Catharus minima)	SMH, MHS, BH	U	F,S
Veery (Catharus fuscescens)	PF, SMH, MHS, BH	C	F,S
*Eastern Bluebird (Sialia sialis)	PF, SH, AL, ML(a-e)	C	All
*Blue-gray Gnatcatcher (Polioptila caerulea)	PF, SH, MHS, SMH, BH, CH	C	All
Golden-crowned Kinglet (Regulus satrapa)	PF, SH, MHS, SMH, BH, CH	R	F,W,S
*Ruby-crowned Kinglet (Regulus calendula)	PF, SMH, SH	A	F,W,S
Water Pipit (Anthus spinoletta)	AL, PF, ML(c,e)	U	F,W,S
*Cedar Waxwing (Bombycilla cedrorum)	AL, PF, SH, SMH, ML(a-e)	C	F,W,S
*Loggerhead Shrike (Lanius ludovicianus)	AL, ML(a-e), PF, SH	C	All
*Starling (Sturnus vulgaris)	AL, ML(a-e)	U	All
*White-eyed Vireo (Vireo griseus)	PF, SH, SMH, MHS, BH, CH	A	All
Yellow-throated Vireo (Vireo flavifrous)	SMH	C	S,Sm,F
*Red-eyed Vireo (Vireo olivaceus)	SMH, PF, SH	C	S,Sm,F
*Black and White Warbler (Mniotilta varia)	SMH, PF, SH	A	F,W,S
*Prothonotary Warbler (Prothonotaria citrea)	MHS, BH, CH	C	S,Sm,F

Table 2.7-5 (Continued)

Common Name/Scientific Name	Habitat	Status	Season of Occurence
Blackpoll Warbler (Dendroica striata)	PF, SH, SMH	C	F,S
*Pine Warbler (Dendroica pinus)	PF, SH	C	All
Prairie Warbler (Dendroica discolor)	PF, SH	C	All
*Palm Warbler (Dendroica palmarum)	ML(b-e), PF, SH, AL	A	F,W,S
*Ovenbird (Seiurus aurocapillus)	SMH	C	F,W,S
Northern Waterthrush (Seiurus noveboracensis)	MHS, BH	C	F,S
Louisiana Waterthrush (Seiurus motacilla)	MHS, BH	U	S,Sm,F
*Common Yellowthroat (Geothypis trichas)	AL, ML(a-e)	C	All
Yellow-breasted Chat (Icteria virens)	MHS(a-e)	C	S,F
Hooded Warbler (Wilsonia citrina)	MHS	C	S,Sm,F
Wilson's Warbler (Wilsonia pusilla)	SMH	R	S,F
Canada Warbler (Wilsonia canadensis)	SMH	VR	S,F
*American Redstart (Setophaga ruticilla)	SMH, MHS	C	S,F
*House Sparrow (Passer domesticus)	AL, ML	U	All
*Bobolink (Dolichonyx oryzivorus)	AL, ML(a,b, c,e)	C	F,W,S
*Eastern Meadowlark (Sturnella magna)	AL, ML(a-e)	C	All
*Red-winged Blackbird (Agelaius phoeniceus)	AL, ML(a-e)	A	All

Table 2.7-5 (Continued)

Common Name/Scientific Name	Habitat	Status	Season of Occurence
Rusty Blackbird (_Euphagus_ _carolinus_)	MHS, CH, BH	C	F,W,S
Brewer's Blackbird (_Euphagus_ _cyanocephalus_)	MHS, SMH	C	F,W,S
*Boat-tailed Grackle (_Quisculas_ _mexicanus_)	AL, ML(a-e)	C	All
*Common Grackle (_Quisculas_ _quiscula_)	SMH, AL, ML(a-e)	C	All
*Brown-headed Cowbird (_Molothrus_ _ater_)	AL, ML(a-e)	U	F,W,S
*Orchard Oriole (_Icterus_ _spurius_)	AL, SMH	U	S,Sm,F
Northern Oriole (_Icterus_ _galbula_)	SMH	C	F,W,S
Scarlet Tanager (_Piranga_ _olivacea_)	SMH	C	S,F
Summer Tanager (_Piranga_ _rubra_)	PF, SL, SMH	C	S,Sm,F
*Cardinal (_Cardinalis_ _cardinalis_)	PF, SL, SMH, BH	C	All
Rose-breasted Grosbeak (_Pheucticus_ _ludovicianus_)	SMH	R	S,F
*Blue Grosbeak (_Guiraca_ _caerulea_)	AL, ML(a-e)	U	S,Sm,F
*Indigo Bunting (_Passerina_ _cyanea_)	AL, ML(a-e)	C	S,Sm,F
Purple Finch (_Carpodacus_ _purplens_)	SMH	C	F,W,S
Pine Siskin (_Cardnelis_ _pinus_)	SH, PF, SMH	R	F,W,S
*American Goldfinch (_Cardnelis_ _tristatus_)	All	C	F,W,S
*Rufuos-sided Towhee (_Pipilo_ _erythrophthalmus_)	PF, SH	A	All

Table 2.7-5 (Continued)

Common Name/Scientific Name	Habitat	Status	Season of Occurence
*Savannah Sparrow (_Passerculus sandwicheusis_)	PF, SH ML, (c-f)	A	All
Grasshopper Sparrow (_Ammodramus savannarum_)	PF, AL, ML(c,e)	C	F,W,S
Henslow's Sparrow (_Ammodramus henslowii_)	PF, AL ML(c,e)	R	F,W,S
LeConte's Sparrow (_Ammodramus candacutus_)	PF, AL ML(c,e)	VR	F,W,S
*Vesper Sparrow (_Pouecetus gramineus_)	PF, AL ML(c,e)	C	F,W,S
Lark Sparrow (_Chondestes grammacus_)	PF, AL ML(c,e)	R	F,W,S
Bachman's Sparrow (_Aimophila aestivalis_)	PF, SH	C	All
*Dark-eyed Juncoe (_Juncoe hyemalis_)	ML(a-e), PF, AL	R	F,W,S
*Chipping Sparrow (_Spizella passerina_)	SMH, PF, SH, AL, ML(a-e)	A	F,W,S
*Field Sparrow (_Spizella pusilla_)	ML(c,e), AL PF	A	F,W,S
*White-crowned Sparrow (_Zonotrichia lencophrys_)	ML(c,e), AL PF, SH	U	F,W,S
*White-throated Sparrow (_Zonotrichia albicollis_)	PF, SH, SMH	C	F,W,S
Fox Sparrow (_Passerella iliaca_)	PF, SH, SMH	C	F,W,S
*Swamp Sparrow (_Melospiza georgiana_)	PF, SH, SMH	C	F,W,S
*Song Sparrow (_Melospiza melodia_)	PF, SH, MHS ML(a-e)	A	F,W,S

Table 2.7-5 (Continued)

LEGEND

Status	*	Observed in area
Habitats		
	PF	Pine Flatwoods, pine plantations, and clear cuts.
	SH	Sandhills
	SMH	Southern Mixed Hardwoods
	CH	Cypress heads
	BH	Bayheads
	MHS	Mixed Hardwood Swamps
	AL	Agriculutral Lands
	ML	Mined Lands
	a	Settling Area
	b	Inactive Settling Area
	c	Reclaimed Area
	d	Unreclaimed Mine
	e	Other habitats (dikes, canals, etc.)
	f	Tailings Area
Status		
	A	Abundant, would be seen virtually every time it is looked for in the right season and habitat.
	C	Common, can be found if looked for but not apparently present.
	U	Uncommon, not always seen though it would be expected if encountered.
	R	Rare, expected each year but in low numbers
	VR	Very Rare, expected but not every year and in very low numbers.

Table 2.7-6 The Herptofauna of the Occidental Study Area and the Habitats They Prefer.

Species Name (Common/Scientific)	Pine-Lands	Flat-woods	Southern Mixed Hardwoods	Mixed Hardwood Swamp	Bayheads	Cypress-heads	Agricul-tural Lands	Agricul-tural Semi-Aquatic Areas	Mined Lands	Remarks
A. Amphibians										
*Oak Toad (*Bufo quercicus*)	X	X							C	
*Southern Toad (*B. terrestris*)	X	X	X	X	X	X	X		C	
*Fowler's Toad (*B. woodhousei*)				X	X		X			
*Florida Cricket Frog (*Acris gryllus dorsalis*)	X	X	X		X	X	X	X	C	In ponds
Gray Treefrog (*Hyla chrysoscelis*)			X	X						
*Green Treefrog (*H. cinerea*)		X	X	X	X	X		X		
*Southern Spring Peeper (*H. crucifer bartramiana*)			X						C	
*Pine Woods Treefrog (*H. femoralis*)	X	X				X				
*Barking Treefrog (*H. gratiosa*)		X	X		X					
*Squirrel Treefrog (*H. squirella*)		X	X		X	X		X		
*Little Grass Frog (*Limnaeodus ocularis*)		X	X		X	X				
*Southern Chorus Frog (*Pseudacris n. nigrita*)		X				X	X		C	
Ornate Chorus Frog (*P. ornata*)		X								
Eastern Narrow-mouthed Toad (*Gastrophryne carolinensis*)	X	X	X				X		C	
Eastern Spadefoot Toad (*Scaphiopus h. holbrooki*)	X		X						C	

Table 2.7-6 (Continued)

Species Name (Common/Scientific)	Pine-Lands	Flat-woods	Southern Mixed Hardwoods	Mixed Hardwood Swamp	Bayheads	Cypress-heads	Agricul-tural Lands	Agricul-tural Semi-Aquatic Areas	Mined Lands	Remarks
Florida Gopher Frog (Rana areolata aesopus)	X								S	
*Bullfrog (R. catesbeiana)	X	X						X	C	In ponds
*Bronze Frog (R. c. clamitans)			X	X					C	
Pig Frog (R. grylio)	X	X	X		X	X	X	X	C	In ponds
River Frog (R. heckscheri)				X		X		X	S	In ponds
*Southern Leopard Frog (R. utricularia)	X	X	X	X	X	X	X	X	C	In ponds
Carpenter Frog (R. virgatipes)						X				
Narrow-striped Dwarf Siren (Pseudobranchus striatus axanthus)		X				X		X		In ponds
Slender Dwarf Siren (P. striatus spheniscus)								X		
Eastern Lesser Siren (Siren i. intermedia)		X		X	X	X			S	In ponds
Greater Siren (S. lacertina)		X		X		X		X	S	In ponds
Striped Newt (Notophthalmus perstriatus)		X				X			S	In ponds
Central Newt (N. viridescens louisianensis)		X	X		X	X		X	S	In ponds
Flatwoods Salamander (Ambystoma cingulatum)						X				
Marbled Salamander (A. opacum)			X							
Mole Salamander (A. talpoideum)			X							Larvae in ponds. Adults terrestrial.

Table 2.7-6 (Continued)

Species Name (Common/Scientific)	Pine-lands	Flat-woods	Southern Mixed Hardwoods	Mixed Hardwood Swamp	Bayheads	Cypress-heads	Agricul-tural Lands	Agricul-tural Semi-Aquatic Areas	Mined Lands	Remarks
Eastern Tiger Salamander (Ambystoma t. tigrinum)			X							Larvae in ponds. Adults terrestrial.
Two-toed Amphiuma (Amphiuma means)				X				X		
Southern Dusky Salamander (Desmognathus auriculatus)						X				
*Dwarf Salamander (Eurycea quadridigitata)		X		X	X		X			
*Slimy Salamander (Plethodon g. glutinosus)		X	X		X	X				
Rusty Mud Salamander (Pseudotriton montanus floridana)			X							
Many-lined Salamander (Stereochilus marginatus)						X		X		
B. Reptiles										
*American alligator (Alligator mississippiensis)								X	C	
Florida Snapping Turtle (Chelydra serpentina osceola)								X	S	
Alligator Snapping Turtle (Macroclemys temmincki)								X		
*Suwannee Cooter (Chrysemys concinna suwanniensis)								X	S	
*Florida Cooter (C. f. floridana)		X	X					X	C	In ponds
Florida Red-bellied Turtle (C. nelsoni)								X	S	
*Yellow-bellied Turtle (C. s. scripta)								X	C	
Spotted Turtle (Clemmys guttata)								X	S	

Table 2.7-6 (Continued)

Species (Common/Scientific)	Pine-lands	Flat-woods	Southern Mixed Hardwoods	Mixed Hardwood Swamp	Bayheads	Cypress-heads	Agricul-tural Lands	Agricul-tural Semi-Aquatic Areas	Mined Lands	Remarks
Eastern Chicken Turtle (Deirochelys r. reticularia)								X	S	
*Florida Box Turtle (Terrapene carolina bauri)		X	X							
*Striped Mud Turtle (Kinosternum bauri palmarum)		X	X	X		X	X		S	In ponds
*Eastern Mud Turtle (K. s. subrubrum)		X				X			S	In ponds
*Loggerhead Musk Turtle (Sternotherus m. minor)								X	S	
Stinkpot (S. odoratus)		X	X				X	X	S	In ponds
*Gopher Tortoise (Gopherus polyphemus)	X		X							
*Florida Softshell (Trionyx ferox)								X	C	
Worm Lizard (Rhineura floridana)	X		X							
*Eastern Slender Glass Lizard (Ophisaurus attenuatus longicaudus)	X								S	
Island Glass Lizard (O. compressus)		X							S	
*Eastern Glass Lizard (O. ventralis)	X	X				X			S	
*Green Anole (Anolis carolinensis)	X	X	X	X	X	X			S	
*Southern Fence Lizard (Sceloporus u. undulatus)	X		X						C	
Northern Mole Skink (Eumeces egregius similis)	X								S	
Five-lined Skink (E. fasciata)		X	X							

Table 2.7-6 (Continued)

Species Name (Common/Scientific)	Pine-Lands	Flat-woods	Southern Mixed Hardwoods	Mixed Hardwood Swamp	Bayheads	Cypress-heads	Agricul-tural Lands	Agricul-tural Semi-Aquatic Areas	Mined Lands	Remarks
*Southeastern Five-lined Skink (Eumeces inexpectatus)	X	X				X				
*Broad-headed Skink (E. laticeps)			X	X	X					
*Ground Skink (Leiolopisma laterale)	X	X	X	X		X	X		C	
*Six-lined Racerunner (Cnemidophorus s. sexlineatus)	X								C	
Northern Scarlet Snake (Cemophora coccinea copei)	X	X	X							
*Southern Black Racer (Coluber constrictor priapus)	X	X	X		X		X		C	
*Southern Ringneck Snake (Drymarchon corais couperi)	X				X				S	
*Corn Snake (E. g. guttata)	X		X						S	
*Rat Snake (E. obsoleta)			X	X	X				C	
*Eastern Mud Snake (Farancia a. abacura)		X		X	X	X		X	S	
Rainbow Snake (F. e. erytrogramma)								X	S	
*Eastern Hognose Snake (Heterodon platyrhinos)	X									
Southern Hognose Snake (H. simus)			X							
Florida Kingsnake (Lampropeltis getulus floridana)			X	X					S	
Scarlet Kingsnake (L. triangulum elapsoides)	X	X								

Table 2.7-6 (Continued)

Species Name (Common/Scientific)	Pine-lands	Flat-woods	Southern Mixed Hardwoods	Mixed Hardwood Swamp	Bayheads	Cypress-heads	Agricul-tural Lands	Agricul-tural Semi-Aquatic Areas	Mined Lands	Remarks
Eastern Coachwhip (Masticophis f. flagellum)	X									
Florida Green Water Snake (Nerodia cyclopion floridana)								X	S	
Red-bellied Water Snake (N. e. erythrogaster)				X			X		S	
*Florida Water Snake (N. fasciata pictiventris)		X	X	X	X	X	X	X	S	Aquatic areas
Brown Water Snake (N. taxispilota)				X				X	C	
Rough Green Snake (Opheodrys aestivas)	X		X		X	X				
Florida Pine Snake (Pituophis melanoleucus mugitus)	X									
Striped Swamp Snake (Regina alleni)					X			X		
Eastern Glossy Water Snake (R. r. rigida)						X		X		
*Pine Woods Snake (Rhadinaea flavilata)		X								
*Black Swamp Snake (Seminatrix pygaea)		X				X				Aquatic areas
Northern Short-tailed Snake (Stilosoma extenuatum multistictum)	X									
Florida Red-bellied Snake (Storeria occipitomaculata obscura)			X							
Florida Crowned Snake (Tantilla relicta neilli)	X		X							
Eastern Garter Snake (Thamnophis s. sirtalis)		X	X		X		X			
*Peninsula Ribbon Snake (T. sauritus sauritus)		X	X		X	X		X		Aquatic areas

Table 2.7 -6 (Continued)

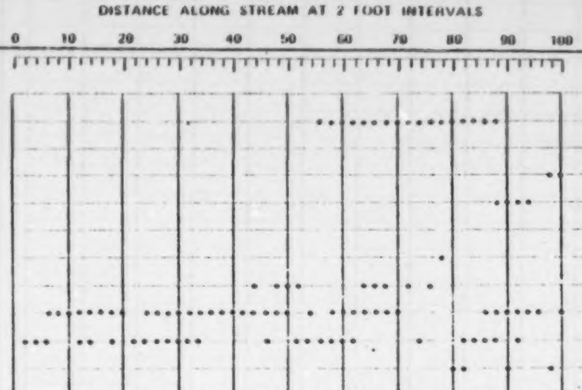
Species Name (Common/Scientific)	Pine-Lands	Flat-woods	Southern Mixed Hardwoods	Mixed Hardwood Swamp	Bayheads	Cypress-heads	Agricul-tural Lands	Agricul-tural Semi-Aquatic Areas	Mined Lands	Remarks
Rough Earth Snake (Virginia striatula)		X				X			S	
Eastern Smooth Earth Snake (V. v. valeriae)			X						S	
*Eastern Coral Snake (Micrurus f. fulvius)	X		X							
*Florida Cottonmouth (Agkistrodon piscivorous conanti)		X	X	X	X	X		X	C	Around streams
Eastern Diamondback Rattlesnake (Crotalus adamanteus)	X	X *							S	
*Dusky Pigmy Rattlesnake (Sistrurus miliaris barbouri)	X	X			X				S	
*Canebrake Rattlesnake (Crotalus horridus atricandatus)		X							S	

LEGEND

*	Confirmed in Study Area
X	Preferred Habitat and/or Habitat in Which Species Occur Frequently
C	Confirmed on Mined Lands
S	Suspected on Mined Lands

Table 2.7-7 Aquatic Macrophytes Along Swift Creek.

Station Number	Species	Percent Cover
SC 4D		
	OVERSTORY (> 4 in. dbh)	
	Betula nigra	33
	UNDERSTORY (< 4 in. dbh)	
	*Fraxinus caroliniana**	4
	Acer rubrum	8
	HERBACEOUS PLANTS	
	*Juncus sp.**	2
	Cicuta maculata	18
	Murdannia keisak	73
	Polygonum hydropiperoides	51
	Unidentified sedge	8



* Indicator Species

Table 2.7-7 (Continued)

Station Number	Species	Percent Cover
SC-5D	OVERSTORY (> 4 in. dbh)	
	Taxodium distichum *	14
	UNDERSTORY (< 4 in. dbh)	
	Acer rubrum	4
	Serenoa repens	14
	HERBACEOUS PLANTS	
	Boehmeria cylindrica	8
	Obolaria virginica	2
	Polygonum hydropiperoides	65
	Rorippa islandica	2
	Saururus cernuus	24
	Unidentified sedge	33

* Indicator Species

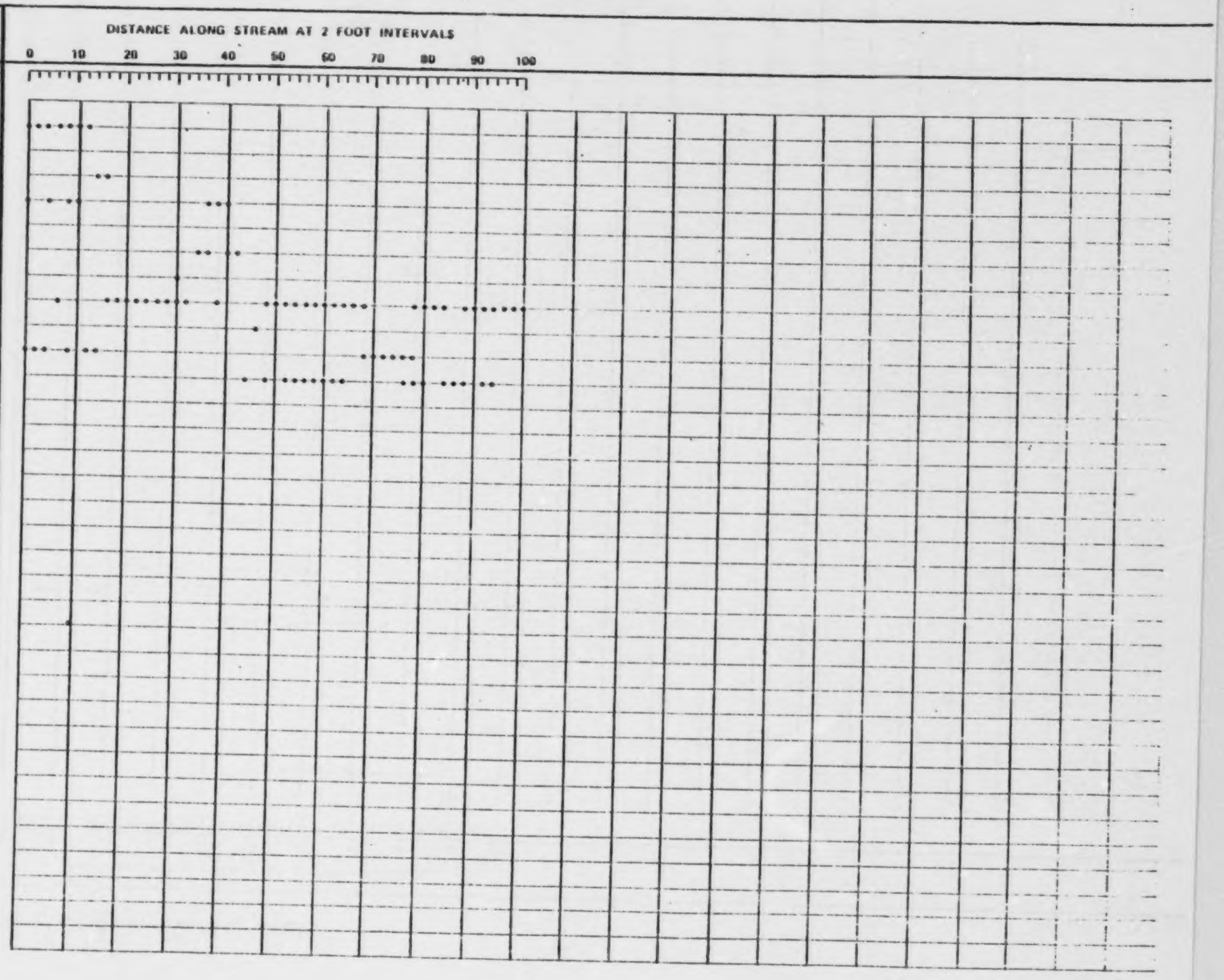
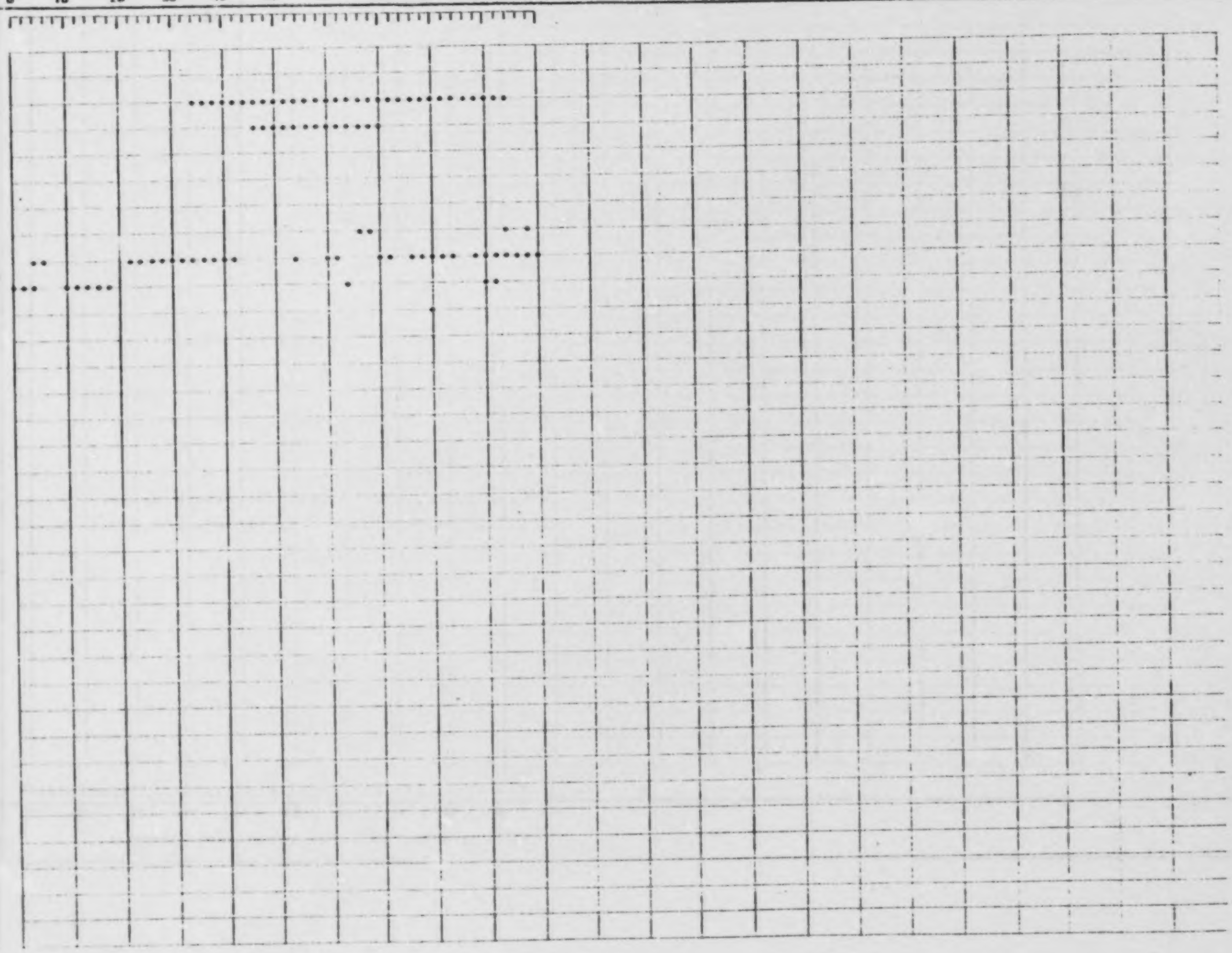


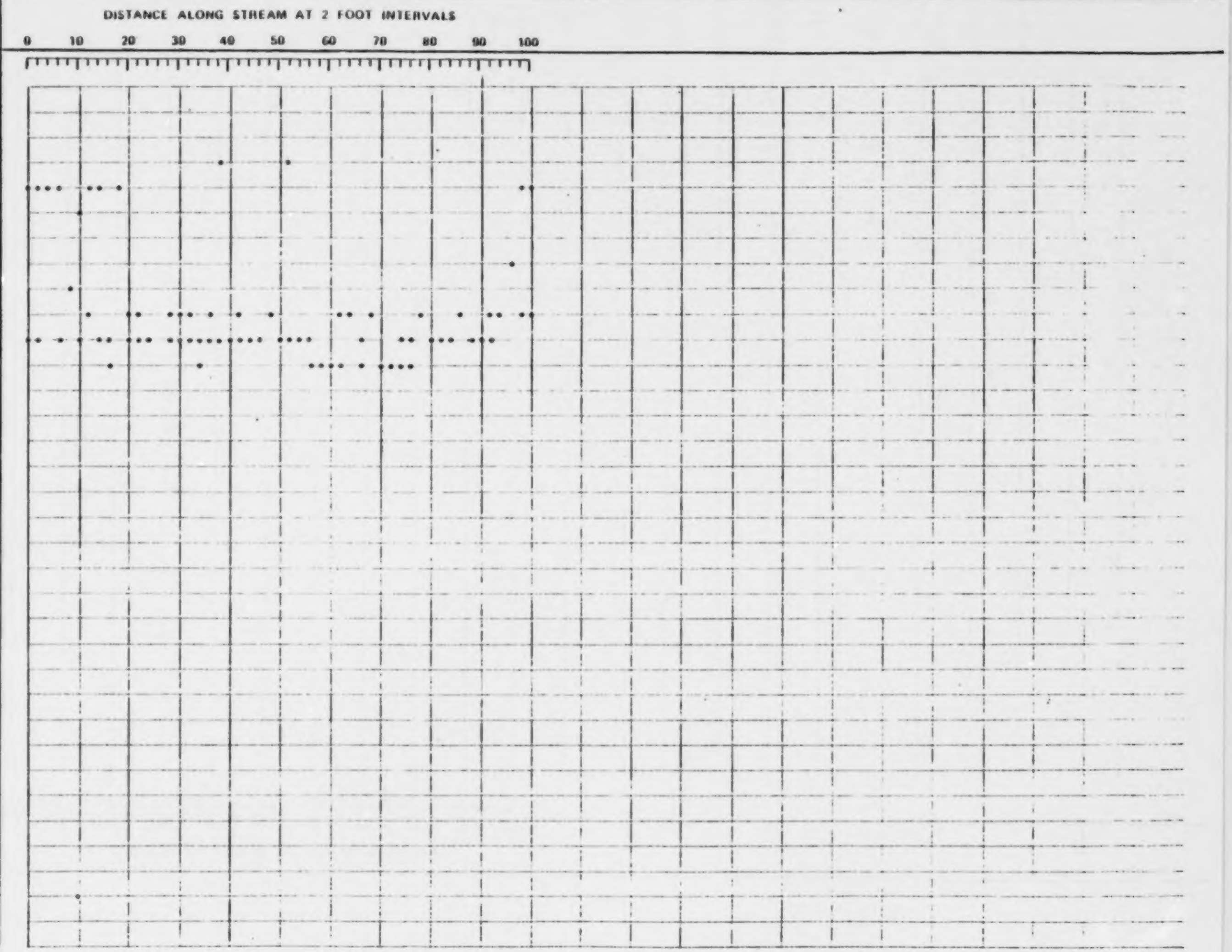
Table 2.7-7 (Continued)

Station Number	Species	Percent Cover	DISTANCE ALONG STREAM AT 2 FOOT INTERVALS
SC-6D			
	OVERSTORY (> 4 in. dbh)		
	*Salix caroliniana**	61	
	Quercus laurifolia	25	
	UNDERSTORY (< 4 in. dbh)		
	None		
	HERBACEOUS PLANTS		
	*Ludwigia sp.**	8	
	Hydrocotyle umbellata	59	
	Polygonum hydropiperoides	22	
	Sterile grass	2	

* Indicator Species

Table 2.7-7 (Continued)

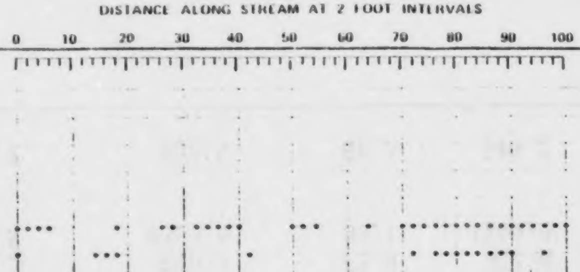
Station Number	Species	Percent Cover
SC-7D	**OVERSTORY (> 4 in. dbh)**	
	None	
	UNDERSTORY (< 4 in. dbh)	
	Cephalanthus occidentalis *	4
	Acer rubrum	18
	Rubus sp.	2
	HERBACEOUS PLANTS	
	Ludwigia sp. *	2
	Lycopus sp.	2
	Panicum scabriusculum	35
	Saururus cernuus	63
	Unidentified sedge	22



* Indicator Species

Table 2.7-7 (Continued)

Station Number	Species	Percent Cover
SC-8D	**OVERSTORY (> 4 in. dbh)**	
	None	
	UNDERSTORY (< 4 in. dbh)	
	None	
	HERBACEOUS PLANTS	
	Juncus sp *	63
	Lemna sp *	29



* Indicator Species

Table 2.7-8 Results of Periphyton Collections From Study Area Streams.

Station	Dry Weight (mg/m^2)	Ash Weight (mg/m^2)	%	Ash-free Weight (mg/m^2)	%	Periphytic Chlorophyll a (mg/m^2)
SC-1	1440.2	1059.2	73.6	381.0	26.4	0.79
SC-2	10120.2	8886.6	87.7	1233.6	12.2	5.50
SC-4A	4417.6	3352.0	75.9	1065.6	24.1	0.44
SC-4B	4863.2	3629.6	74.6	1233.6	25.4	0.63
SC-6	1737.2	1188.4	68.4	548.8	31.6	1.52
SC-7	12626.0	8634.8	68.4	3991.2	31.6	5.00
ABC-8	41895.2	37516.6	89.6	4378.6	10.4	0.56
SC-9	3448.8	2641.4	76.6	807.4	23.4	1.38
CB-1	361.6	180.8	50.0	180.8	50.0	0.59
CB-2	484.4	232.6	40.0	251.8	60.0	0.61
CB-3	142.0	*	--	142.0	100.0	0.15
RC-2	219.6	84.0	38.3	135.6	61.7	2.90
HC-1	2493.0	1834.2	73.6	658.8	26.4	0.08
RO-2	581.2	406.8	70.0	174.4	30.0	0.32
SR-7	471.4	297.0	63.0	174.4	37.0	0.75
SR-8	3268.0	3120.0	95.5	148.0	4.5	0.71
CB-$\overline{X}$	329.3	206.7	62.8	122.6	37.2	0.45
SC-$\overline{X}$	10068.6	8363.6	83.1	1705.0	16.9	1.98
Natural Stream $\overline{X}$	376.7	232.5	61.7	144.2	38.3	1.22

*Negligible.

Table 2.7-9 Periphyton Summary Table.

Station	Number of Taxa	Diversity	Equitability
SC-1	16	3.25	0.88
SC-2	23	2.98	0.48
SC-4A	20	3.39	0.75
SC-4B	17	3.25	0.82
SC-6	21	2.80	0.48
SC-7	16	2.66	0.55
ABC-8	18	2.61	0.49
SC-9	9	1.88	0.53
CB-1	18	2.35	0.39
CB-2	16	1.94	0.31
CB-3	11	0.32	0.13
RC-2	12	2.95	0.92
HC-1	9	1.18	0.31
RO-2	13	1.93	0.38
SR-7	18	2.48	0.42
SR-8	19	3.01	0.58
SC-$\overline{X}$	18	2.85	0.62
CB-$\overline{X}$	15	1.54	0.28
Natural Stream $\overline{X}$	13	.214	0.53

Table 2.7-10 Comparisons of Mean of Fall and Winter Samplings for Macroinvertebrates (Natural Substrate).

Station[1]	Fall, 1977 Sampling			Winter, 1978 Sampling			Calculated 't' Values		
	Diversity	Equitability	Beck's Biotic Index	Diversity	Equitability	Beck's Biotic Index	Diversity	Equitability	Beck's Biotic Index
SC-1	1.90	0.75	5.0	---[2]	---	---	---	---	---
SC-2	0.56	0.36	3.7	2.04	1.04	4.0	-11.48*	-3.06*	-0.19
SCT-3	3.07	0.88	11.0	---	---	---	---	---	---
SC-4A	2.89	0.70	14.7	---	---	---	---	---	---
SC-4B	2.93	0.62	15.7	1.49	0.48	7.3	3.84*	1.37	4.49*
SCT-5	3.16	0.53	20.7	---	---	---	---	---	---
SC-6	3.26	0.80	11.3	2.70	0.97	6.3	1.11	-1.71	1.64
SC-7	1.21	0.27	7.5	1.31	0.53	4.8	-0.59	-1.83	0.52
ABC-8	0.73	0.70	1.0	0.82	0.50	4.3	0.10	1.49	-1.89
SC-9	2.60	0.59	8.0	1.60	0.42	6.0	2.95*	0.99	1.73
SC-9.5	2.69	0.66	8.7	---	---	---	---	---	---
SC-x̄	2.26	0.59	9.3	1.83	0.69	5.7			
CB-1	2.38	0.91	2.0	---	---	---	---	---	---
CB-2	3.02	0.89	6.3	1.84	0.63	3.0	3.85*	1.00	1.00
CB-3	2.04	0.54	9.3	---	---	---	---	---	---
CB-x̄	2.48	0.78	5.9						
RC-2	3.06	0.66	19.3	3.45	1.08	9.0	0.87	-2.24	3.42*
RO-2	3.28	0.36	15.0	2.63	0.86	9.8	0.27	1.53	1.64
HC-1	3.22	0.82	10.0	0.92	1.19	6.0	0.25	-7.60*	8.66*
SR-7	2.47	0.75	9.3	2.54	1.00	5.0	4.31*	-0.20	4.33*
SR-8	2.64	0.80	11.7	2.30	0.92	5.0	1.32	-1.48	8.00*
NS-x̄	2.94	0.60	13.4	2.64	0.86	7.27			

---

[1] SC=Swift Creek, SCT=Swift Creek tributary, ABC=Altman Bay Canal, SC-x̄=mean of SCstations, CB=Camps Branch, CB-x̄=mean of CB stations, RC=Rocky Creek, RO=Roaring Creek, HC=Hunter Creek, SR=Suwannee River, NS-x̄=mean of natural streams, i.e. RC, RO and CB.

[2] (---) Indicates no sample available.

* Significant at 0.05 probability level, $t_{.05,4} = 2.78$.

Table 2.7-11 Comparisons of Mean of Fall and Winter Samplings for Macroinvertebrates (Artificial Substrate).

	Fall, 1977 Sampling			Winter, 1978 Sampling			Calculated 't' Values		
Station[1]	Diversity	Equitability	Beck's Biotic Index	Diversity	Equitability	Beck's Biotic Index	Diversity	Equitability	Beck's Biotic Index
SC-1	---[2]	---	---	---	---	---	---	---	---
SC-2	2.04	0.77	8.3	1.58	0.59	8.0	1.06	1.29	0.10
SCT-3	---	---	---	---	---	---	---	---	---
SC-4A	1.84	0.58	8.8	2.17	0.80	10.3	---	---	---
SC-4B	2.35	0.71	7.8	---	---	---	0.41	-0.69	-1.89
SCT-5	---	---	---	---	---	---	---	---	---
SC-6	2.60	0.78	8.5	---	---	---	---	---	---
SC-7	1.69	0.84	6.3	1.02	0.67	5.7	---	---	---
ABC-8	1.19	0.57	2.0	1.05	0.75	4.5	0.57	-0.07	-0.28
SC-9	1.85	0.72	5.3	1.36	1.06	4.0	0.26	-0.71	-1.00
SC-9.5	---	---	---	---	---	---	1.31	-1.78	0.56
							---	---	---
SC-$\bar{x}$	2.06	0.73	7.5	1.53	0.78	7.0			
CB-1	2.34	1.17	6.5	---[2]	---	---	---	---	---
CB-2	2.25	1.14	7.0	1.44	0.77	6.5	1.70	2.24	1.00
CB-3	2.23	1.18	6.0	---	---	---	---	---	---
CB-$\bar{x}$	2.27	1.16	6.5						
RC-2	1.70	0.93	6.3	1.76	0.99	6.0	-0.61	-1.80	0.33
RO-2	2.50	0.81	10.5	1.18	0.81	5.3	7.87*	0.29	1.51
HC-1	2.45	0.88	10.0	3.19	1.01	11.8	-3.81*	-2.28*	-1.70
SR-7	2.14	0.72	11.0	0.80	0.33	10.0	---	---	---
SR-8	2.00	0.75	9.0	1.33	0.75	6.0	2.01	0.07	1.50
NS-$\bar{x}$	2.16	0.97	7.7	1.45	0.83	5.9			

[1] SC=Swift Creek, SCT=Swift Creek tributary, ABC=Altman Bay Canal, SC-$\bar{x}$= mean of SC stations, CB=Camps Branch, CB-$\bar{x}$= mean of CB stations, RC=Rocky Creek, RO=Roaring Creek, HC=Hunter Creek, SR=Suwannee River, NS-$\bar{x}$=mean of natural streams, i.e. RC, RO and CB.

[2] (---) Indicates no sample available.

* Significant at 0.05 probability level, $t_{.05,4} = 2.78$

Table 2.7-12 Comparison of Macroinvertebrate Community Indices in Swift Creek and Control Streams.

Station	Diversity			Equitability			Biotic Index		
	Fall, 1977 Sampling with Artificial Substrates								
	mean	s	F	mean	s	F	mean	s	F
SC-$\bar{x}$	2.06	0.35	0.13	0.73	0.09	7.44*	7.50	0.39	0.05
NS-$\bar{x}$	2.16	0.41		0.97	0.18		7.77	2.37	
	Winter, 1978 Sampling with Artificial Substrates								
	mean	s	F	mean	s	F	mean	s	F
SC-$\bar{x}$	1.53	0.48	0.07	0.78	0.21	0.14	7.00	2.74	0.42
NS-$\bar{x}$	1.45	0.29		0.83	0.07		5.93	0.60	
	Fall, 1977 Sampling of Natural Substrates								
	mean	s	F	mean	s	F	mean	s	F
SC-$\bar{x}$	2.26	0.95	0.01	0.59	0.19	<0.01	9.33	4.30	1.46
NS-$\bar{x}$	2.94	0.41		0.60	0.22		13.40	6.84	
	Winter, 1978 Sampling of Natural Substrates								
	mean	s	F	mean	s	F	mean	s	F
SC-$\bar{x}$	1.83	0.56	2.92	0.69	0.29	0.72	5.68	1.29	0.82
NS-$\bar{x}$	2.64	0.01		0.86	0.23		7.27	3.72	

Table 2.7-13 Biomass Means for Macroinvertebrates Collected From Stream Sediments In Study Area During the Fall, 1977 Sampling Period.

Station	Wet Weight (g/m^2)	Dry Weight (g/m^2)	Ash Weight (g/m^2)	%	Ash-free Weight (g/m^2)	%
SC-1	2.747	0.085	0.004	4.7	0.081	95.3
SC-2	4.012	0.313	0.160	51.1	0.153	48.9
SCT-3	2.843	0.182	0.071	39.0	0.111	61.0
SC-4A	9.100	0.667	0.137	20.5	0.530	79.5
SC-4B	12.511	1.125	0.498	44.3	0.627	55.7
SCT-5	17.740	2.300	0.605	26.3	1.695	73.7
SC-6	25.284	2.680	0.461	17.2	2.219	82.8
SC-7	20.568	1.917	1.011	52.7	0.906	47.3
ABC-8	95.720	8.736	3.660	41.9	5.076	58.1
SC-9	3.550	0.154	0.029	18.8	0.125	81.2
SC-9.5	2.530	0.108	0.038	35.2	0.070	64.8
SC-$\bar{x}$	19.558	1.754	0.666	38.0	1.088	62.0
CB-1	4.804	0.467	0.004	0.9	0.463	99.1
CB-2	5.043	0.534	0.252	47.2	0.282	52.8
CB-3	19.046	2.971	1.379	46.4	1.592	53.6
CB-$\bar{x}$	9,631	1.324	0,545	41,2	0.779	58.8
RC-2	3.273	0.158	0.009	5.7	0.149	94.3
HC-1	6.780	0.916	0.307	33.5	0.609	66.5
RO-2	12.887	2.053	0.404	19.7	1.649	80.3
SR-7	8.241	0.554	0.293	52.9	0.261	47.1
SR-8	19.447	0.997	0.104	10.4	0.893	89.6
Natural Stream $\bar{x}$*	8.597	1.178	0.319	27.1	0.859	72.9

*Mean of RC, RO and CB.

Table 2.7-14 Biomass Means for Macroinvertebrates Collected On Hester Dendys From Streams; In Study Area During the Fall, 1977 Sampling Period.

Station	Wet Weight (g/m^2)	Dry Weight (g/m^2)	Ash Weight (g/m^2)	%	Ash-free Weight (g/m^2)	%
SC-2	3.329	0.366	0.032	8.7	0.334	91.3
SC-4A	18.675	2.109	0.112	5.3	1.997	94.7
SC-4B	12.112	1.199	0.162	13.5	1.037	86.5
SC-6	2.948	0.278	0.054	19.4	0.224	80.6
SC-7	6.506	0.568	0.049	8.4	0.537	91.6
ABC-8	12.725	0.846	0.086	10.2	0.760	89.8
SC-9	2.651	0.208	0.054	26.0	0.154	74.0
CB-1	1.655	0.168	0.078	46.4	0.090	53.6
CB-2	1.002	0.100	0.003	3.0	0.097	97.0
CB-3	0.337	0.017	0.003	17.6	0.014	82.4
HC-1	1.277	0.100	0.017	1.7	0.083	98.3
RC-2	1.620	0.289	0.020	6.9	0.269	93.1
RO-2	2.911	0.346	0.095	27.5	0.251	72.5
SR-7	2.889	0.206	0.012	5.8	0.194	94.2
SR-8	1.683	0.117	0.006	5.1	0.111	94.9
CB-$\bar{x}$	0.998	0.095	0.028	29.5	0.067	70.5
SC-$\bar{x}$	8.421	0.799	0.078	9.8	0.701	90.2
Natural Stream $\bar{x}$	1.843	0.243	0.048	19.8	0.195	80.2

Table 2.7-15 Species Name and Habitat Preference for Fishes Collected During the November, 1977 Sampling of Swift Creek and Four Local Control Streams.

Scientific Name/Common Name	Swift Creek	Control	Typical Habitat
Esox americanus Redfin pickerel		X	Heavily vegetated sloughs.
Esox niger Chain pickerel		X	Vegetated lakes and larger streams.
Notemigonus crysoleucas Golden shiner	X	X	Vegetated lakes and larger streams.
Notropis hypselopterus Sailfin shiner	X	X	Small to moderate-sized, flowing streams, with or without vegetation.
Notropis leedsi Ohoopee shiner	X		Rivers and largest creeks, with good flow and no vegetation.
Notropis petersoni Coastal shiner	X		Moderate to large streams, with good flow, with or without vegetation.
Notropis texanus Weed shiner	X		Rivers and largest creeks, with good flow and no vegetation (true in Suwannee system; less so elsewhere).
Notropis venustus Blacktail shiner	X		Rivers and largest creeks, with good flow and no vegetation (true in Suwannee system; less so elsewhere).
Ictalurus natalis Yellow bullhead		X	Heavily vegetated sloughs.
Aphredoderus sayanus Pirate perch		X	Heavily vegetated sloughs.

Table 2.7-15 (Continued)

Scientific Name/Common Name	Swift Creek	Control	Typical Habitat
Fundulus notti lineolatus Lined topminnow		X	Small to medium-sized, flowing streams, with or without vegetation.
Leptolucania ommata Pygmy killifish		X	Heavily vegetated sloughs to large streams or lakes, but almost always with vegetation.
Gambusia affinis holbrooki Mosquitofish	X	X	Ubiquitous; in all types of habitats, but if in large open streams are in quiet water along shore.
Heterandria formosa Least killifish	X	X	May occur in heavily vegetated sloughs or in small to large streams or lakes, but always with vegetation.
Labidesthes sicculus vanhyningi Brook silverside	X		Medium-sized to large streams, generally in open flowing water away from vegetation.
Centrarchus macropterus Flier	X		Heavily vegetated sloughs to medium-sized streams, almost always with some vegetation.
Elassoma evergladei Everlades pgymy sunfish		X	Heavily vegetated sloughs.
Enneacanthus gloriosus Bluespotted sunfish		X	Heavily vegetated sloughs.
Enneacanthus obesus Banded sunfish		X	Heavily vegetated sloughs.
Lepomis auritus Redbreast sunfish	X	X	Medium sized, flowing streams, sometimes with vegetation.

Table 2.7-15 (Continued)

Scientific Name/Common Name	Swift Creek	Control	Typical Habitat
Lepomis gulosus	X	X	Heaviliy vegetated sloughs to medium-sized rivers, usually with some vegetation.
Lepomis macrochirus Bluegill	X	X	Medium-sized streams and rivers to lakes usually with some vegetation.
Lepomis punctatus Spotted sunfish		X	Medium-sized, flowing streams to lakes, usually with some vegetation.
Micropterus salmoides Largemouth bass	X		Medium-sized, flowing streams to lakes, usually with some vegetation.
Percina nigrofasciata .Blackbanded darter	X	X	Medium to large flowing streams, usually without vegetation.

Table 2.7-16 Results of Fish Sampling Conducted in November, 1977 at Swift Creek and Four Local Control Streams.

Station	Replicate	No. Species	Diversity $\bar{D}$	Total Weight (g)
Swift Creek				
SC-2	1	0		
	2	0		
	3	2	0.44	15.9
Average $\bar{D}$ = 0.44 Estimated Station Biomass = 1.83 kg/ha				
SC-4	1	4	1.92	11.4
	2	3	1.39	13.2
	3	3	1.09	36.9
Average $\bar{D}$ = 1.47 Estimated Station Biomass = 4.04 kg/ha				
SC-7	1	5	0.43	92.3
	2	4	0.71	45.4
	3	2	0.99	168.2
Average $\bar{D}$ = 0.71 Estimated Station Biomass = 26.37 kg/ha				
ABC-8	1	4	0.13	886.3
	2	1	0	10.6
	3	4	0.41	101.7
Average $\bar{D}$ = 0.18 Estimated Station Biomass = 47.19 kg/ha				
SC-9	1	3	1.15	50.5
	2	3	0.87	26.3
	3	4	1.83	82.1
Average $\bar{D}$ = 1.28 Estimated Station Biomass = 16.52 kg/ha				

Table 2.7-16 (Continued)

Station	Replicate	No. Species	Diversity $\overline{D}$	Total Weight (g)
Control Stations				
RO-2	1	7	2.43	30.6
	2	3	1.58	41.6
	3	2	0.31	3.1
Average $\overline{D}$ = 1.44 Estimated Station Biomass = 3.25 kg/ha				
CB-2	1	4	1.58	49.8
	2	4	1.92	2.5
	3	0		
Average $\overline{D}$ = 1.75 Estimated Station Biomass = 2.5 kg/ha				
HC-1	1	3	1.3	1.9
	2	0		
	3	6	1.9	12.7
Average $\overline{D}$ = 1.6 Estimated Station Biomass = 2.07 kg/ha				
RC-2	1	3	1.53	5.8
	2	0		
	3	0		
Average $\overline{D}$ = 1.53 Estimated Station Biomass = 0.12 kg/ha				

Table 2.7-17 One-Way Analysis for Variance For Fish Diversity Indices Between Swift Creek and Local Control Streams.

1. All Swift Creek Stations vs. All Control Stations:

	Average Station Diversity					$\bar{X}$	S
Swift Creek	0.44	1.47	0.71	0.18	1.28	0.82	0.55
Control	1.44	1.75	1.6	1.53	--	1.58	0.13

ANOVA

Source	SS	df	MS	F
Treatments	1.30	1	1.30	7.25
Error	1.25	7	0.18	
Total	2.55	8		

$F_{tab.,.05} = 5.59$

2. Representative Swift Creek Station vs. Individual Control Stations:

	Replicate Diversity			$\bar{X}$	S
SC-4	1.92	1.39	1.09	1.47	0.42
RO-2	2.43	1.58	0.31	1.44	1.07
CB-2	1.58	1.92	--	1.75	0.24
HC-1	1.3	00	1.9	1.60	0.42

ANOVA

Source	SS	df	MS	F
Treatments	0.14	3	0.05	0.10
Error	2.87	6	0.48	
Total	3.01	9		

$F_{tab,.05} = 4.76$

Table 2.7-18 One-Way Analysis of Variance for Fish Biomass Estimates Between Swift Creek and Local Control Streams.

1. All Swift Creek Stations vs. All Control Stations:
Mean Biomass (kg/ha) Per Station

Swift Creek	1.83	4.04	26.37	57.10	16.52	$\overline{x}$ = 21.17, S = 22.4
Control	3.25	2.5	2.07	0.12	--	x = 1.99, S = 1.34

ANOVA

Source	SS	df	MS	F
Treatments	818.09	1	818.09	2.85
Error	2012.45	7	287.49	
Total	2830.54	8		

$F_{.05,1,7} = 5.59$

2. Representative Swift Creek Station vs. Each Control Station:
Replicate Biomass (kg/ha)

SC-4	4.38	2.24	5.51	$\overline{x}$ = 4.04, S = 1.66
RO-2	5.46	3.85	0.44	x = 3.25, S = 2.56
CB-2	7.01	0.49	0	x = 2.5, S = 3.91
HC-1	1.12	0	5.08	x = 2.07, S = 2.67
RC-2	0.37	0	0	x = 0.12, S = 0.21

ANOVA

Source	SS	df	MS	F
Treatments	26.18	4	6.55	1.03
Error	63.63	10	6.36	
Total	89.81	14		

$F_{.05,1,7} = 3.48$

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Table 2.7-19 Vegetation Station Locations and Sampling Methods for Swift Creek.

Station No.	Approximate Distance From Suwannee (mi.)	Creek System	Channel or Stream Bed Description †	Major Vegetation Type	Geomorphology and Significant Ecological Facets	Types of Transects Used in Sampling
Swift Creek						
SC-1	<0.1	Mid Creek	Natural, deeply incised bed (20-25 ft. deep, 35-40 ft. wide)	Southern Mixed Hardwoods	Limestone outcropping continuous; dominant flow from Occidental	a, b
SC-2	1.4	Mid Creek	Natural, deeply incised bed (10-14 ft. deep, 30-35 ft. wide)	Southern Mixed Hardwoods	Limestone outcroppings present; dominant flow from Occidental	a, b
SC-3	2.4	Mid Creek	Natural, deeply incised bed (8-10 ft. deep, 35-40 ft. wide)	Southern Mixed Hardwoods	No limestone outcrops present; dominant flow from Occidental	a, b
SC-4	3.2	Mid Creek	Natural, well-defined bed (4-6 ft. deep, 35-40 ft. wide)	Southern Mixed Hardwoods	No limestone outcrops present; dominant flow from Occidental, highly stressed dead tree area.	a, b
SC-5	5.8	Mid Creek	Natural, well-defined bed (2-4 ft. deep, 55-60 ft. wide)	Southern Mixed Hardwoods	No limestone outcrops present; dominant flow from Occidental, highly stressed dead tree area.	a, b
SC-6	7.3	Mid Creek	Channelized, well-defined bed (2-4 ft. deep, 45-50 ft. wide)	Southern Mixed Hardwoods/ Pine Plantation	No limestone outcrops present; dominant flow from Occidental; disturbed vegetation area.	a, c
SC-7	9.8	Upper Creek	Channelized, well-defined bed (2-4 ft. deep, 65-70 ft. wide)	Mixed Hardwood Swamp	No limestone outcrops present; above Occidental flow.	a, c
SC-8	11.8	Upper Creek	Channelized, well-defined bed (4-6 ft. deep, 15-20 ft. wide)	Mixed Hardwood Swamp	No limestone outcrops present; above Occidental flow.	a, c

† Channel or stream bed description refers only to the bed itself and not to a cross-sectional area of water.

a Line transect perpendicular to stream.

b Point quarter plotless sampling parallel to stream.

c Line transect parallel to stream.

TABLE 2.7-20 Percent cover of plant species found along line transects oriented perpendicular to Swift Cree

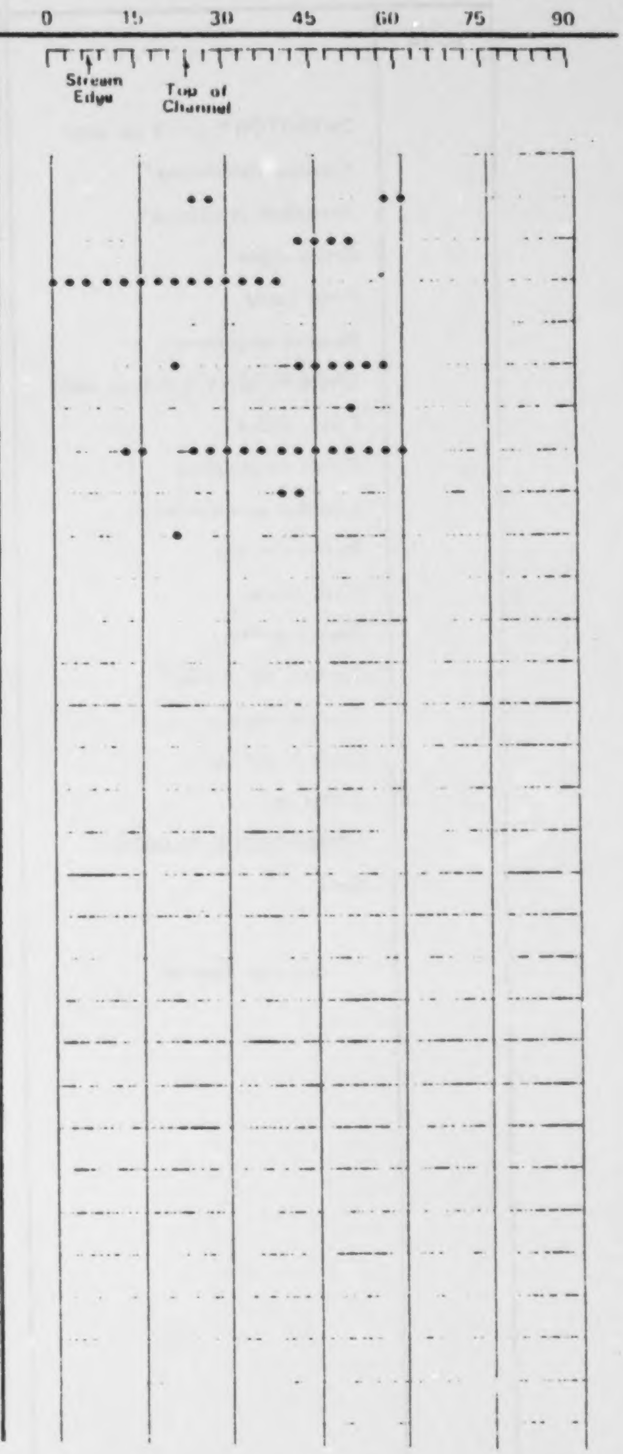
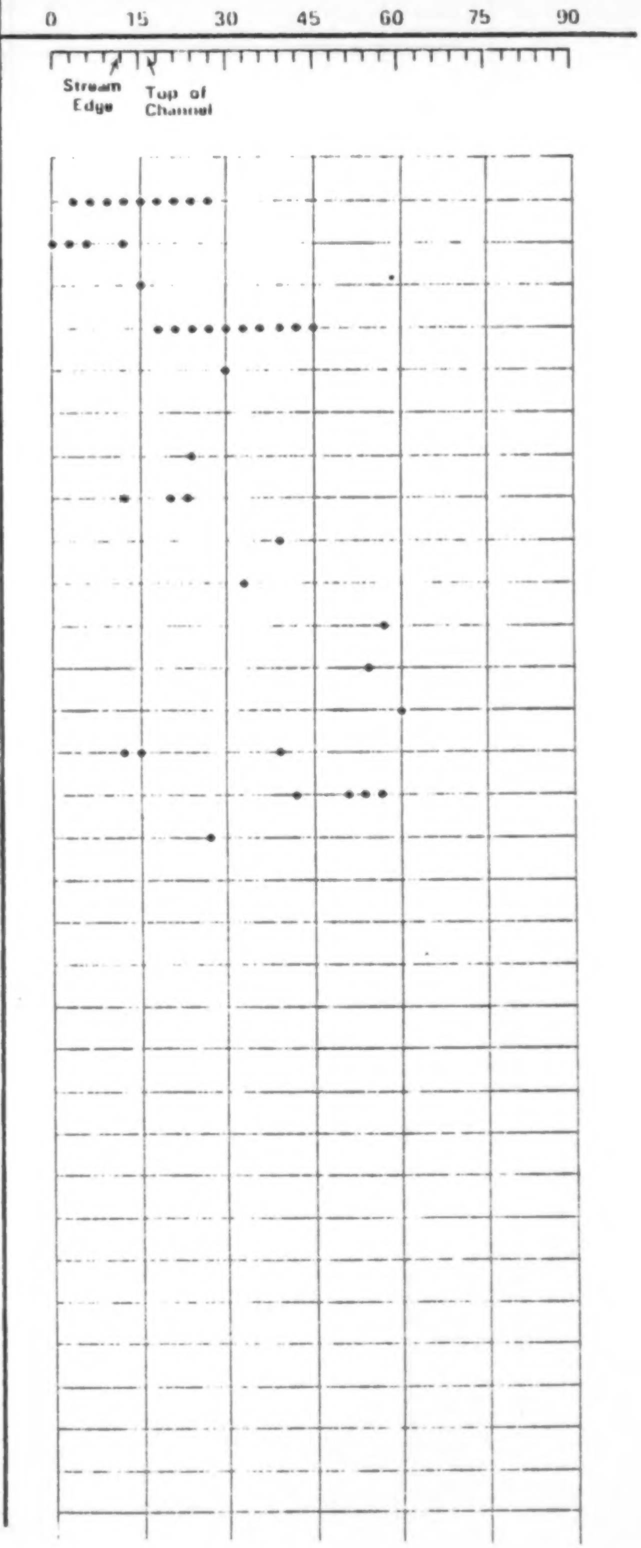
Station Number	Species	Percent Cover	DISTANCE FROM MID-STREAM AT 3-FOOT INTERVAL
SC-1A			
	OVERSTORY (> 4 in. dbh)		
	Liquidambar styraciflua	19	
	Pinus elliottii	19	
	Quercus virginiana	67	
	UNDERSTORY (< 4 in. dbh)		
	Liquidambar styraciflua	33	
	Quercus myrtifolia	5	
	Serenoa repens	71	
	Vaccinium arboreum	10	
	Vaccinium elliottii	5	
	HERBACEOUS PLANTS		
	None		

TABLE 2.7-20 (Continued)

Station Number	Species	Percent Cover
SC-2A		
	OVERSTORY (> 4 in. dbh)	
	Fraxinus caroliniana *	43
	Taxodium distichum *	19
	Betula nigra	5
	Pinus taeda	48
	Quercus virginiana	5
	UNDERSTORY (< 4 in. dbh)	
	Carya glabra	5
	Cyrilla racemiflora	14
	Lonicera sempervirens	5
	Myrica cerifera	5
	Pinus taeda	5
	Prunus serotina	5
	Quercus myrtifolia	5
	Quercus nigra	14
	Quercus stellata	19
	Smilax sp.	5
	HERBACEOUS PLANTS	
	None	

DISTANCE FROM MID-STREAM AT 3-FOOT INTERVALS



* Indicator Species

TABLE 2.7-20 (Continued)

Station Number	Species	Percent Cover
SC-3A		
	OVERSTORY (> 4 in. dbh)	
	Taxodium distichum *	17
	Acer rubrum	46
	Betula nigra	21
	Quercus virginiana	17
	UNDERSTORY (< 4 in. dbh)	
	Campsis radicans	21
	Cyrilla racemiflora	13
	Liquidambar styraciflua	13
	Sebastiania fruticosa	4
	Serenoa repens	17
	Vaccinium elliottii	17
	Vitis sp.	13
	HERBACEOUS PLANTS	
	Juncus sp. *	4
	Sterile grass	25
	Woodwardia virginica	4

* Indicator Species

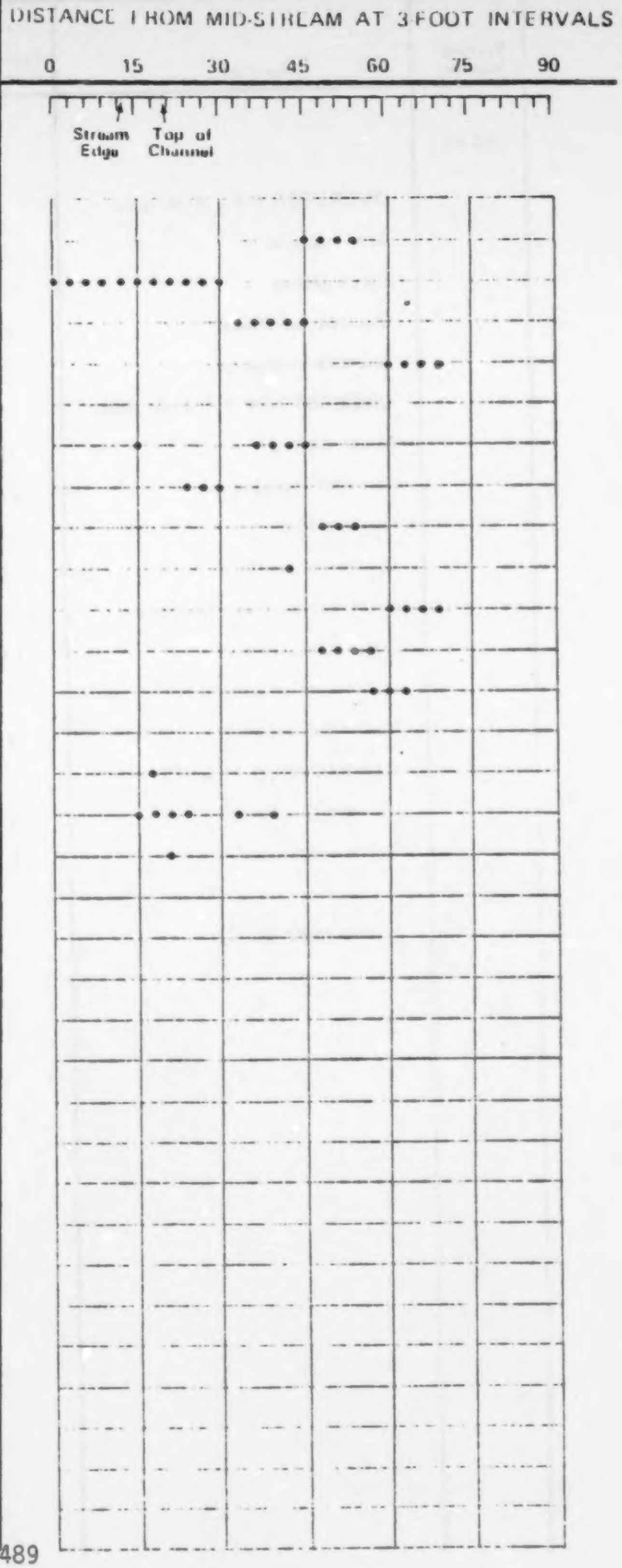
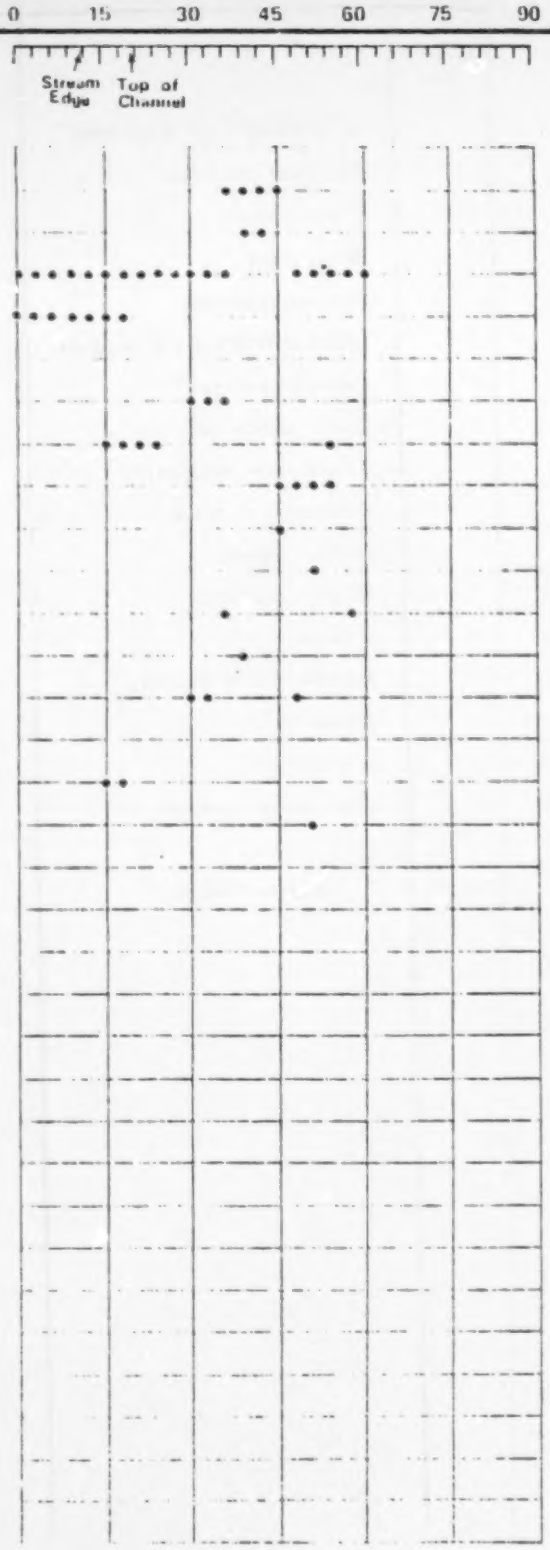


TABLE 2.7-20 (Continued)

Station Number	Species	Percent Cover	DISTANCE FROM MID STREAM AT 3 FOOT INTERVALS
SC-4A			
	OVERSTORY (> 4 in dbh)		
	Acer rubrum	19	
	Carya glabra	10	
	Quercus laurifolia	86	
	Quercus michauxii	33	
	UNDERSTORY (< 4 in. dbh)		
	Nyssa biflora *	14	
	Campsis radicans	24	
	Carya glabra	19	
	Cyrilla racemiflora	5	
	Parthenocissus quinquefolia	5	
	Sebastiania fruticosa	10	
	Vaccinium amoenum	5	
	Vaccinium elliottii	14	
	HERBACEOUS PLANTS		
	Murdannia keisak	10	
	Sterile grass	5	

* Indicator Species

TABLE 2.7-20 (Continued)

Station Number	Species	Percent Cover	DISTANCE FROM MID-STREAM AT 3-FOOT INTERVALS
SC-5A			
	OVERSTORY (< 4 in. dbh)		
	Taxodium distichum *	14	
	Quercus laurifolia	81	
	Quercus virginiana	29	
	UNDERSTORY (> 4 in. dbh)		
	Cephalanthus occidentalis *	10	
	Acer rubrum	29	
	Quercus nigra	14	
	Serenoa repens	33	
	Vaccinium amoenum	10	
	Vaccinium elliottii	14	
	HERBACEOUS PLANTS		
	Polygonum hydropiperoides	5	
	Saururus cernuus	10	

* Indicator Species

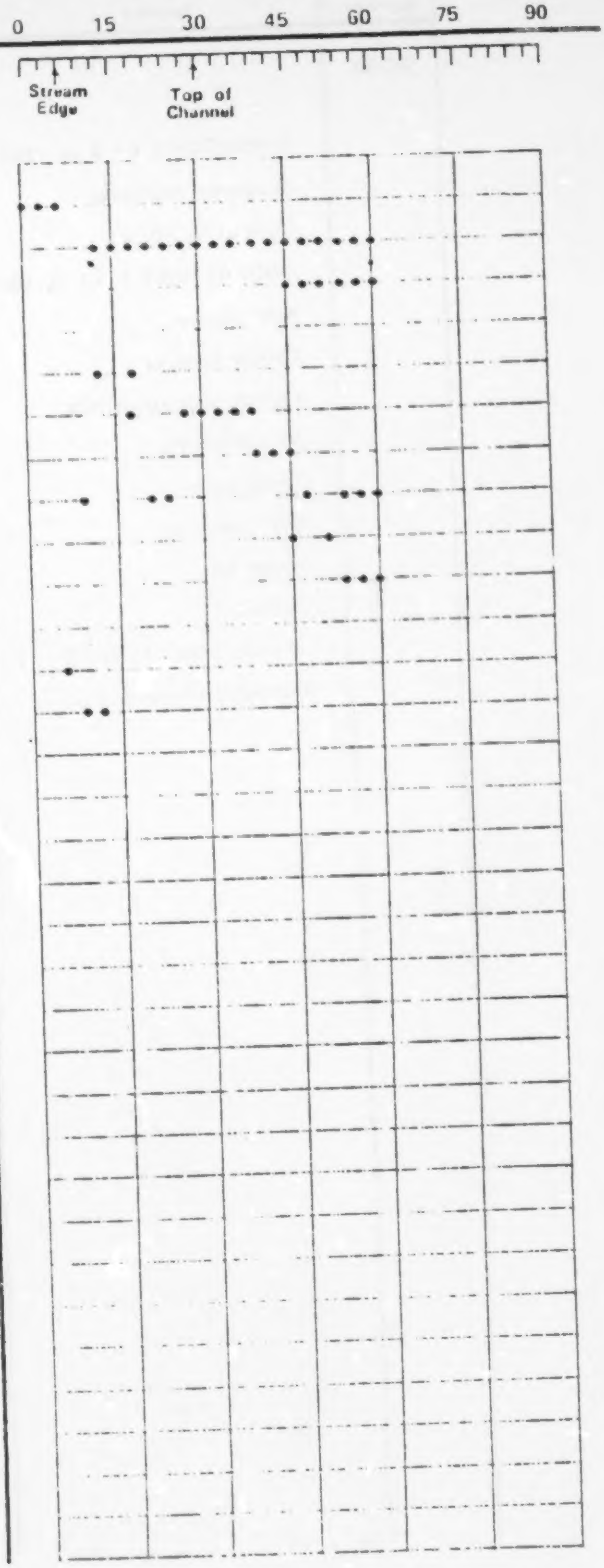


TABLE 2.7-20 (Continued)

Station Number	Species	Percent Cover
SC-6A		
	OVERSTORY (> 4 in. dbh)	
	Diospyros virginiana	*29*
	Quercus laurifolia	*90*
	UNDERSTORY (< 4 in. dbh)	
	Acer rubrum	*14*
	Cornus foemina	*48*
	Liquidambar styraciflua	*10*
	Myrica cerifera	*10*
	Persea palustris	*10*
	Rhus radicans	*5*
	Smilax sp.	*19*
	Vitis sp.	*14*
	HERBACEOUS PLANTS	
	Boehmeria drummondiana	*5*

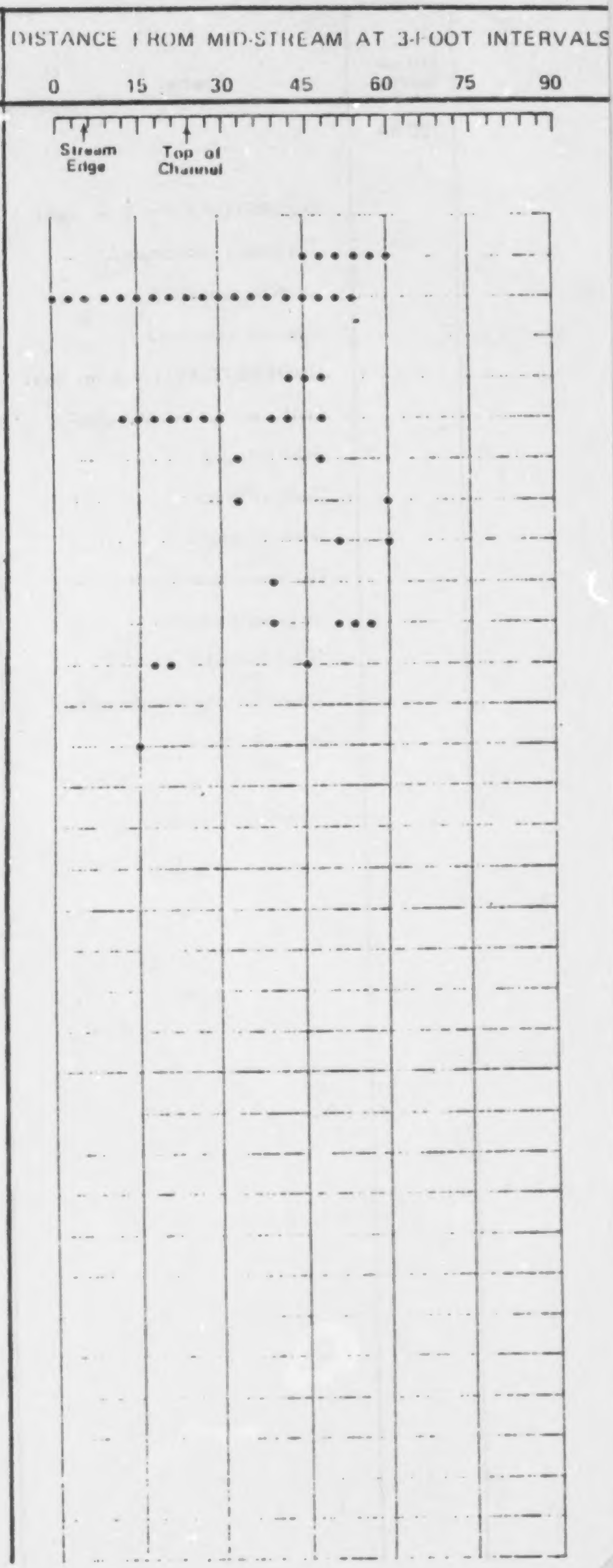


TABLE 2.7-20 (Continued)

Station Number	Species	Percent Cover
SC-7A		
	OVERSTORY (> 4 in. dbh)	
	Nyssa biflora *	54
	Taxodium distichum *	10
	Acer rubrum	28
	Liquidambar styraciflua	3
	Magnolia virginiana	25
	UNDERSTORY (< 4 in. dbh)	
	Nyssa biflora *	8
	Acer rubrum	22
	Rhus radicans	1
	Rubus sp	1
	Vitis sp	2
	HERBACEOUS PLANTS	
	Ludwigia sp *	5
	Anthemis sp	1
	Lycopus sp	1
	Mikania sp	1
	Panicum scabriusculum	2
	Saururus cernuus	18
	Unidentified herb	22
	Woodwardia virginica	1

* Indicator Species

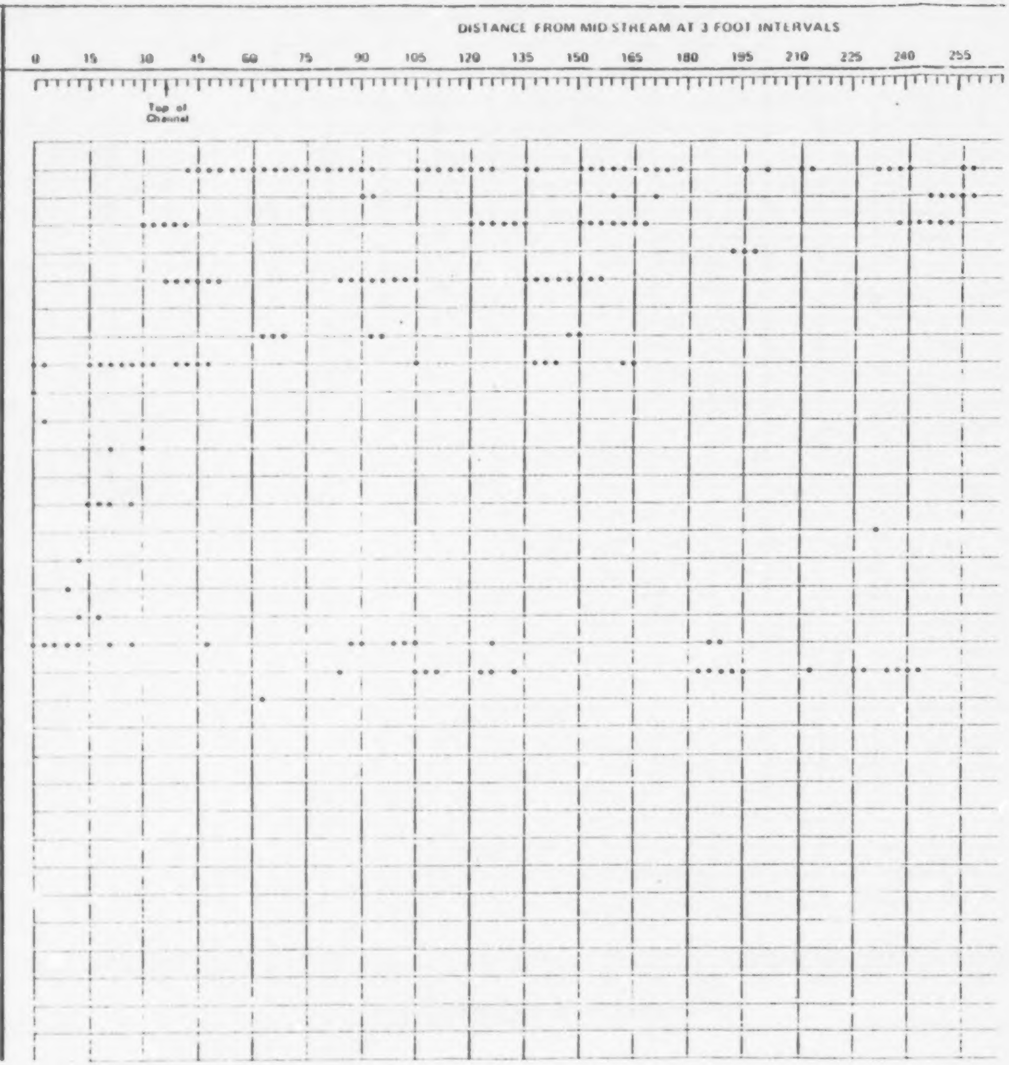


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TABLE 2.7-20 (Continued)

Station Number	Species	Percent Cover
SC 8A		
	OVERSTORY (>4 in. dbh)	
	Nyssa biflora *	37
	Taxodium distichum *	15
	Myrica cerifera	3
	Pinus elliottii	2
	UNDERSTORY (<4 in. dbh)	
	Cephalanthus occidentalis *	2
	Nyssa biflora *	29
	Taxodium distichum *	6
	Acer rubrum	13
	Baccharis halimifolia	1
	Clethra alnifolia	21
	Cyrilla racemiflora	7
	Itea virginica	5
	Leucothoe racemosa	16
	Lyonia lucida	8
	Magnolia virginiana	3
	Myrica cerifera	4
	Rosa palustris	2
	Rubus sp.	9
	Smilax sp	1
	HERBACEOUS PLANTS	
	Cladium jamaicense *	3
	Juncus sp *	23
	Ludwigia sp *	1
	Osmunda regalis *	1
	Panicum sp *	2
	Pontederia lanceolata *	1
	Andropogon virginicus	1
	Anthemis sp	1
	Aristida sp	1
	Boehmeria drummondiana	2
	Dulichium arundinaceum	2

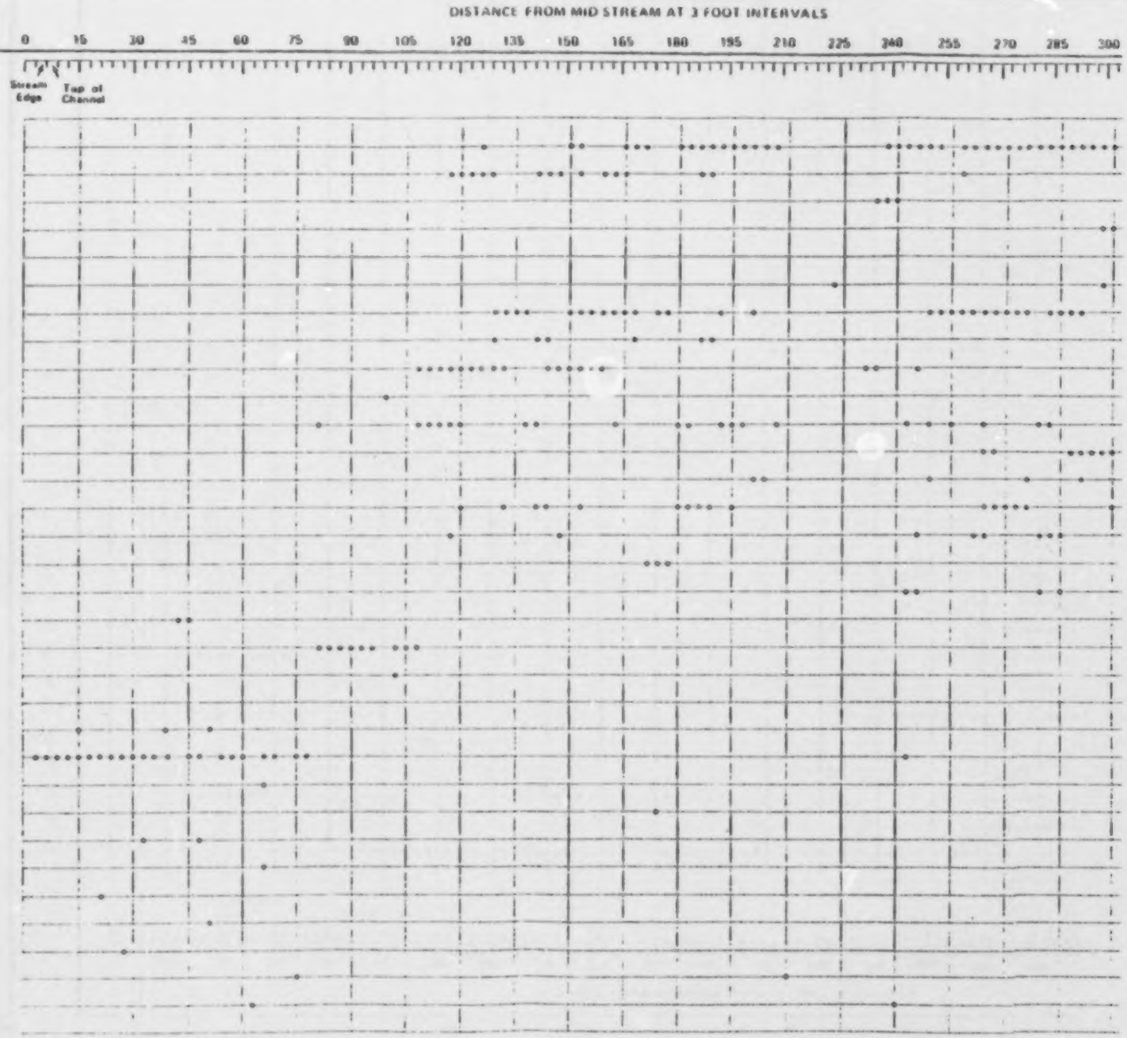

TABLE 2.7-20 (Continued)

Station Number	Species	Percent Cover
SC 8A	**HERBACEOUS PLANTS (Continued)**	
	Lycopus sp	5
	Obolaria virginica	1
	Osmunda cinnamomea	1
	Polygonum hydropiperoides	2
	Saururus cernuus	6
	Sterile grass	2
	Triadenum virginicum	1
	Unidentified sedge	1
	Woodwardia virginica	2

* Indicator Species

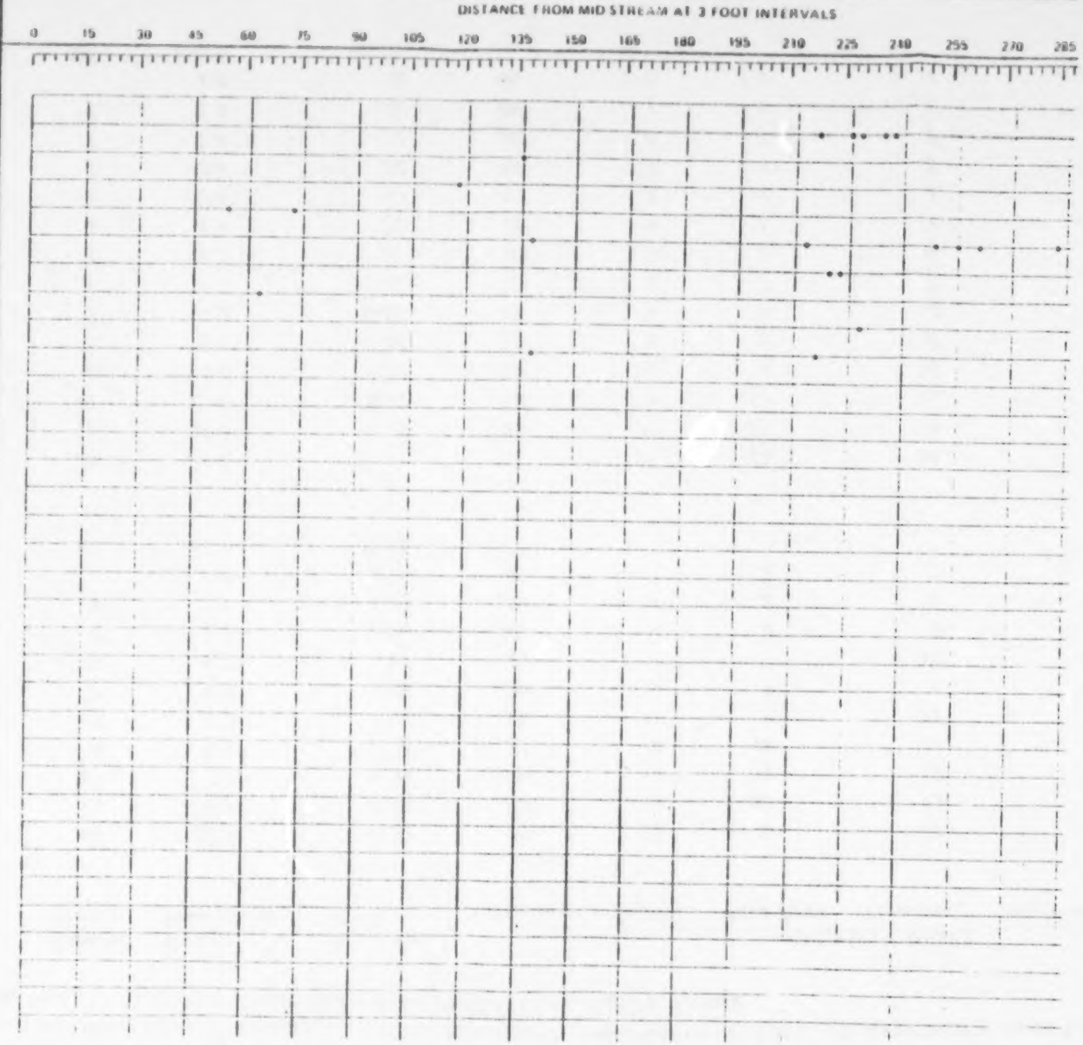

Table 2.7-21 Relative Density, Frequency, Basal Area and Importance Values of Overstory Species Obtained From Point Quarter Transects Run Parallel To Swift Creek.

Station No. Species	Number Trees	Density (Trees/Acre)	Basal Area $(Ft.^2)$	Frequency	RELATIVE INDEX **			
					Density	Basal Area	Frequency	Importance Value
SC-1C								
Acer rubrum	19	13.2	14.21	.75	24	19	24	67
Taxodium distichum *	13	9.0	18.94	.40	16	25	13	54
Quercus laurifolia	11	7.7	11.84	.50	14	16	16	46
Quercus virginiana	8	5.5	13.78	.35	10	18	11	39
Quercus nigra	9	6.3	6.67	.35	11	9	11	31
Betula nigra	7	4.9	4.09	.20	9	5	6	20
Diospyros virginiana	6	4.2	.97	.30	7	1	10	18
Liquidambar styraciflua	3	2.1	2.80	.10	4	4	3	11
Nyssa biflora *	3	2.1	1.29	.15	4	2	5	11
Pinus taeda	1	.7	1.29	.05	1	2	2	5
Totals	80	55.7	75.88					
SC-2C								
Betula nigra	20	28.4	14.2	.70	25	31	21	77
Taxodium distichum *	16	22.8	12.49	.65	20	27	19	66
Nyssa biflora *	11	15.6	5.49	.50	14	12	15	41
Carpinus caroliniana	8	11.4	1.83	.35	10	4	10	24
Quercus virginiana	5	7.1	2.48	.20	6	5	6	17
Pinus taeda	3	4.3	3.66	.15	4	8	4	16
Acer rubrum	3	4.3	3.23	.10	4	7	3	14
Quercus nigra	4	5.7	.75	.20	5	2	6	13
Fraxinus caroliniana *	3	4.3	.32	.15	4	1	4	9
Liquidambar styraciflua	2	2.8	.43	.10	2	1	3	6
Carya glabra	2	2.8	.22	.10	2	< 1	3	5
Quercus laurifolia	1	1.4	.22	.05	1	< 1	2	3
Quercus stellata	1	1.4	.10	.05	1	< 1	2	3
Diospyros virginiana	1	1.4	.10	.05	1	< 1	2	3
Totals	80	113.7	45.52					

TABLE 2.7-21 (Continued)

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Station No. Species	Number Trees	Density (Trees/Acre)	Basal Area (Ft.^{2})	Frequency	RELATIVE INDEX ** Density	Basal Area	Frequency	Importance Value
SC-3C								
Betula nigra	24	35.7	17.22	.70	30	31	23	84
Taxodium distichum *	12	17.9	10.76	.55	15	19	18	52
Liquidambar styraciflua	10	14.9	8.61	.45	12	16	15	43
Quercus virginiana	8	11.9	9.15	.35	10	17	11	38
Carpinus caroliniana	11	16.4	1.72	.35	14	3	11	28
Quercus nigra	4	5.9	1.61	.15	5	3	5	13
Carya glabra	4	6.0	1.29	.20	5	2	6	13
Pinus taeda	2	3.0	3.23	.10	3	6	3	12
Acer rubrum	2	3.0	.54	.10	3	1	3	7
Pinus elliottii	1	1.5	1.07	.05	1	2	2	5
Salix caroliniana *	1	1.5	.10	.05	1	< 1	2	3
Magnolia grandiflora	1	1.5	.10	.05	1	< 1	2	3
Totals	80	119.2	55.40					
SC-4C								
Taxodium distichum *	27	21.1	17.87	.65	34	32	22	88
Betula nigra	13	10.2	10.01	.40	16	18	14	48
Acer rubrum	9	7.0	3.77	.45	11	7	16	34
Liquidambar styraciflua	9	7.0	3.23	.40	11	6	14	31
Quercus virginiana	5	3.9	9.36	.20	6	17	7	30
Quercus laurifolia	7	5.5	6.14	.30	9	11	10	30
Quercus nigra	3	2.3	3.98	.15	4	7	5	16
Ilex opaca	3	2.3	.54	.15	4	1	5	10
Nyssa biflora *	2	1.6	.43	.10	3	1	3	7
Pinus taeda	1	.8	1.18	.05	1	2	2	5
Fraxinus caroliniana *	1	.8	.10	.05	1	< 1	2	3
Totals	80	62.5	56.61					

* Indicator Species

** Values rounded to nearest whole number

Table 2.7-22 Small Mammals of Natural Communities in Swift Creek Watershed as Assessed by Traplines. +

	HABITAT							
	High Pinelands		Pine-palmetto Flatwoods		Mixed Hardwood System		Swamp Systems	
Species	Number Collected	Trap Success	Number Collected	Trap Success	Number Collected	Trap Success	Number Collected	Trap Success
Hispid Cotton Rat	-	-	1	0.6	-	-	-	-
Cotton Mouse	2	1.1	2	1.1	2	1.1	1	0.6
Golden Mouse	-	-	-	-	-	-	2	1.1
Least Shrew	1	0.6	-	-	-	-	-	-
Short-tailed Shrew	-	-	2	1.1	-	-	-	-

+ Based on total 720 trapnights.

* 180 trapnights per habitat, trap success = number individuals/100 trapnights.

Summary:

Habitat type	Number Collected	Number Species	Trap Success
High Pinelands	3	2	1.7
Pine-palmetto Flatwoods	5	3	2.8
Mixed Hardwood Systems	2	1	1.1
Swamp Systems	3	2	1.7
TOTAL	13	5	1.8

Table 2.7-23 Confirmed Mammal Species of Swift Creek Drainage, Natural Communities, Swift Creek Mine Complex and Suwannee River Mine Complex.

Common Name/ Scientific Name	Natural Communities	Swift Creek Mine Complex	Suwannee River Mine Complex
Virginia Opossum (*Didelphis marsupialis*)	X	X	X
Least Shrew (*Cryptotis parua*)	X	X	X
Short-tailed Shrew (*Blarina brevicanda*)	X		X
Southeastern Mole (*Scalopus aquaticus*)	X	X	X
Yellow Bat (*Lasiurus intermedius*)	X		X
Red Bat (*Lasiurus borealis*)	X		X
Hoary Bat (*Lasiurus cinereus*)	X		
Big Brown Bat (*Eptesicus fuscus*)	X		
Evening Bat (*Nycticeius humeralis*)	X		
Oldfield Mouse (*Peromyscus polionotus*)	X		X
Cotton Mouse (*Peromyscus gossypinus*)	X	X	X
Golden Mouse (*Ochrotomys nuttalli*)	X		
Rice Rat (*Oryzomys palustris*)		X	X
Hispid Cotton Rat (*Sigmodon hispidus*)	X	X	X
House Mouse (*Mus musculus*)		X	X

Table 2.7-23 (Continued)

Common Name Scientific Name	Natural Communities	Swift Creek Mine Complex	Suwannee River Mine Complex
Beaver (*Castor canadensis*)	X		
Southeastern Pocket Gopher (*Geomys pinetus*)	X		
Southern Flying Squirrel (*Glaucomys volans*)	X		
Eastern Gray Squirrel (*Sciurus carolinensis*)	X		
Eastern Cottontail (*Sylvilagus floridanus*)	X	X	X
Marsh Rabbit (*Sylvilagus palustris*)	X		
Nine-banded Armadillo (*Dasypus movencinctus*)	X	X	X
Raccoon (*Procyon lotor*)	X	X	X
Southeastern Weasel (*Mustela frenata olivacea*)			X
River Otter (*Lutra canadensis*)	X	X	X
Spotted Skunk (*Spilogale putorius*)	X		
Striped Skunk (*Mephitis mephitis*)	X		X
Gray Fox (*Urocyon cinereoargenteus*)	X	X	X
Bobcat (*Lynx rufus*)	X	X	X
White-tailed Deer (*Odocoileus virginianus*)	X	X	X

Table 2.7-23 (Continued)

Common Name Scientific Name	Natural Communities	Swift Creek Mine Complex	Suwannee River Mine Complex
Ferd Hog (*Sus scrofa*)	X		X

x = Confirmed by trap lines, sign, tracks, direct observation, and/or literature.

Table 2.7-24 Small Mammals of Swift Creek Mine Complex As Assessed By Traplines.

Species	MINE PHASE					
	Unreclaimed Mine		Sand-tailings		Inactive Settling Area	
	Number Collected	Trap Success*	Number Collected	Trap Success*	Number Collected	Trap Success*
Hispid Cotton Rat	4	1.7	1	0.4	2	0.8
Rice Rat	1	0.4	-	-	-	-
Cotton Mouse	3	1.2	-	-	-	-
House Mouse	2	0.8	-	-	7	2.9
Least Shrew	3	1.2	-	-	-	-

+ Based on total of 720 trapnights

* 240 trapnights per mine phase, trap success = number individuals/100 trapnights

Summary:

Habitat	Number Collected	Number Species	Trap Success
Unreclaimed mine	13	5	5.4
Sand-tailings	1	1	0.4
Inactive Settling Areas	9	2	3.8
TOTAL	23	5	3.2

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Table 2.7-25 Small Mammals of the Suwannee River Mine Complex as Assessed by Trap Lines.

	MINE PHASE									
	Reclaimed Area		Active Settling Area		Inactive Settling Area		Unreclaimed Mine		Sand-tailings Area	
Species	Number Collected	Trap Success[*]	Number Collected	Trap Success[*]	Number Collected	Trap Success[*]	Number Collected	Trap Success[*]	Number Collected	Trap Success[*]
Hispid Cotton Rat	7	5.8	4	3.3	2	1.7	6	5.0	1	1.7
Rice Rat	-	-	-	-	2	1.7	-	-	-	-
Cotton Mouse	2	1.7	-	-	2	1.7	3	2.5	-	-
Oldfield Mouse	-	-	-	-	-	-	2	1.7	-	-
House Mouse	4	3.3	2	1.7	4	3.3	5	4.2	1	1.7

[†] Based on total of 540 trapnights.

[*] 120 trapnights per mine phase, except sand-tailings based on 60 trapnighs, trap success = number of individuals/100 trapnights

Summary:

Habitat	Number Collected	Number Species	Trap Success
Reclaimed Area	13	3	10.8
Active Settling Area	6	2	5.0
Inactive Settling Area	10	4	8.3
Unreclaimed Mine	16	4	13.3
Sand-tailings	2	2	3.3
TOTAL	47	5	8.7

Table 2.7-26 Comparison of Small Mammals Assessed By Traplines In Communities Versus Mine Phase Communities.

Site	Habitat/Mine Phase	Number Collected	Number Species	Trap* Success
Swift Creek Natural Communities	High Pinelands	3	2	1.7
	Pine-palmetto Flatwoods	5	3	2.8
	Mixed Hardwood Swamps	2	1	1.1
	Swamp Systems	3	2	1.7
Swift Creek Mine Complex	Unreclaimed Mine	13	5	5.4
	Sand-tailings	1	1	0.4
	Inactive Settling Area	9	2	3.8
Suwannee River Mine Complex	Reclaimed Area	13	3	10.8
	Active Settling Area	6	2	5.0
	Inactive Settling Area	10	4	8.3
	Unreclaimed Mine	16	4	13.3
	Sand-tailings	2	2	3.3

*Swift Creek natural communities based on total of 720 trapnights, 180 per habitat type; Swift Creek Mine Complex mine phases based on total of 720 trapnights, 240 per mine phase; Suwannee River Mine Complex mine phases based on total of 540 trapnights, 120 per mine phase with sand-tailings mine phase based on 60 trapnights.

Summary:

Site	Number Collected	Number Species	Trap Success	Total Number of Confirmed Species
Swift Creek Natural Community	13	5	1.8	28
Swift Creek Mine Complex	23	5	3.2	14
Suwannee River Mine Complex	47	5	8.7	21

Table 2.7-27 Birds of the Sandhill Habitat Along the Swift Creek Watershed.

Species	Birds/Hour
Yellow-rumped Warbler	22
Pine Warbler	17
Cardinal	7
Carolina Chickadee	5
American Robin	4
Ruby-crowned Kinglet	2
Yellow-shafted Flicker	2
Fish Crow	2
House Wren	2
Hermit Thrush	2
Red-bellied Woodpecker	1
Eastern Phoebe	1
Carolina Wren	1
White-eyed Vireo	1
Rufuos-sided Towhee	1

Table 2.7-28 Birds of the Pine-Palmetto Flatwoods Along the Swift Creek Watershed.

Species	Birds/Hour
Rufous-sided Towhee	12
Carolina Wren	9
Fish Crow	5
Common Crow	3
American Robin	3
Cardinal	3
Red-shouldered Hawk	1
Pileated Woodpecker	1
House Wren	1
Also Observed in the Habitat but not During Counts	
Yellow-rumped Warbler	
White-throated Sparrow	
Tufted Titmouse	
Pine Warbler	
Carolina Chickadee	
Blue-gray Gnatcatcher	
Ruby-crowned Kinglet	
Solitary Vireo	
Yellow-throated Warbler	
White-eyed Vireo	
Turkey Vulture	

Table 2.7-29 Birds of the Southern Mixed Hardwoods Along the Swift Creek Watershed.

Species	Birds/Hour
Carolina Wren	11
Cardinal	7
Pileated Woodpecker	5
American Robin	4
Red-bellied Woodpecker	3
Blue Jay	2
Hermit Thrush	2
Eastern Phoebe	1
Common Crow	1
Brown Thrasher	1
Ovenbird	1
Observed in Habitat but not During Counts	
Solitary Vireo	
Blue-gray Gnatcatcher	
Ruby-crowned Kinglet	
Tufted Titmouse	
Carolina Wren	
Red-tailed Hawk (edge)	
American Kestrel (edge)	

Table 2.7-30 Birds of the Bayheads of the Swift Creek Watershed.

Species	Birds/Hour
Yellow-rumped Warbler	11
White-throated Sparrow	5
Blue Jay	4
Red-bellied Woodpecker	3
Carolina Wren	3
Pileated Woodpecker	2
Carolina Chickadee	2
Cardinal	2
Swamp Sparrow	2
Downy Woodpecker	1
Yellow-bellied Sapsucker	1
Brown Thrasher	1
American Robin	1
White-eyed Vireo	1
Pine Warbler	1
Rufous-sided Towhee	1

Table 2.7-31 Birds of the Mixed Hardwood Swamp Along the Swift Creek Watershed.

Species	IPA Results Birds/Hour
Carolina Wren	14
Cardinal	13
Wood Duck	11
American Robin	6
Red-shouldered Hawk	4
Carolina Chickadee	4
Brown Thrasher	4
Hermit Thrush	4
Red-winged Blackbird	4
Rufous-sided Towhee	4
Pileated Woodpecker	3
House Wren	3
Catbird	3
Yellow-rumped Warbler	3
Belted Kingfisher	2
Eastern Phoebe	2
Blue Jay	2
Anhinnga	1
Great Blue Heron	1

Table 2.7-31 (Continued)

Species	IPA Results Birds/Hour
Red-tailed Hawk	1
Red-bellied Woodpecker	1
Birds Observed in this Habitat but not During Counts	
American Woodcock	
Yellow-billed Cuckoo	
Blue-gray Gnatcatcher	
Tufted Titmouse	
White-eyed Vireo	
Yellow-throated Warbler	
White-throated Sparrow	
American Goldfinch	
Common Flicker	

Table 2.7-32 Birds of the Cypress Heads of the Swift Creek Watershed.

Species	Birds/Hour
Swamp Sparrow	5
Red-bellied Woodpecker	3
Pileated Woodpecker	2
Common Grackle	2
Red-shouldered Hawk	1
House Wren	1
American Robin	1
Red-winged Blackbird	1
White-throated Sparrow	1
Birds Observed in Habitat but not During Counts	
Hooded Merganser	

Table 2.7-33 Birds of the Agricultural Lands Along the Swift Creek Watershed.

Species	Birds/Hour
Field Sparrows	100
American Goldfinch	42
Chipping Sparrow	40
Black Vulture	16
Mourning Dove	13
Common Crow	8
Eastern Meadowlark	5
American Kestrel	3
Turkey Vulture	2
Palm Warbler	2
Bobwhite	2
Mockingbird	1
Swamp Sparrow	1
Also Observed in Habitat but not on Counts	
Sharp-shinned Hawk	
Red-tailed Hawk	
Red-shouldered Hawk	
Marsh Hawk	
Common Snipe	
Loggerhead Shrike	
Eastern Bluebird	

Table 2.7-33 (Continued)

Species	Birds/Hour
Also Observed in Habitat but not on Counts (Cont'd)	
American Robin	
Rusty Blackbird	
Red-winged Blackbird	
Brown-headed Cowbird	
Common Grackle	
Vesper Sparrow	
Son Sparrow	
Yellow-rumped Warbler	
Eatern Phoebe	
Cattle Egret	
Ground Dove	
Starling	

Table 2.7-34 Birds of the Inactive Settling Area on Occidental's Swift Creek Mine.

Species	Birds/Hour
Green-winged Teal	275
Red-winged Blackbird	221
Lesser Yellowlegs	56
Blue-winged Teal	50
Pintail	35
Greater Yellowlegs	32
Least Sandpiper	32
Northern Shoveler	28
Brown-headed Cowbird	25
Killdeer	16
Little Blue Heron	9
Mallard	5
Great Blue Heron	4
Common Snipe	3
Ring-billed Gull	3
Yellow-rumped Warbler	3
Wood Duck	1
Hooded Merganser	1
Turkey Vulture	1
Sharp-shinned Hawk	1
Marsh Hawk	1

Table 2.7-34 (Continued)

Species	Birds/Hour
Belted Kingfisher	1
American Robin	1
Observed in Habitat but not During Counts	
Snow Goose	
Cooper's Hawk	
Red-tailed Hawk	
American Kestrel	
Loggerhead Shrike	
Common Grackle	
Boat-tailed Grackle	
Black Vulture	
Swamp Sparrow	
Savannah Sparrow	
Great Egret	
Little Blue Heron	
Common Yellowthroat	
House Wren	
Common Gallinule	
Gadwal	
Dowitcher sp.	

Table 2.7-35 Birds of the Old Fields of Occidental's Swift Creek Mine.

Species	Birds/Hour
Starling	22
Mourning Dove	16
Yellow-rumped Warbler	9
Savannah Sparrow	6
Marsh Hawk	5
Eastern Bluebird	5
American Kestrel	4
Mockingbird	4
Killdeer	3
American Robin	3
Red-winged Blackbird	3
Boat-tailed Grackle	3
Red-tailed Hawk	2
Vesper Sparrow	2
Chipping Sparrow	2
Turkey Vulture	1
Common Crow	1
House Wren	1
Eastern Meadowlark	1

Table 2.7-35 (Continued)

Species	Birds/Hour
Birds Observed in the Study Area but not During the Counts	
American Goldfinch	
Song Sparrow	
Cattle Egret	
Red-shouldered Hawk	
Loggerhead Shrike	
Ground Dove	
Common Flicker	
Swamp Sparrow	
Eastern Phoebe	
Rock Dove	

Table 2.7-36 Birds of the Mined Lands of Occidental's Swift Creek Mine.

Species	Birds/Hour
Turkey Vulture	82
Ring-billed Gull	36
American Robin	20
Mourning Dove	19
Pied-billed Grebe	14
Hooded Merganser	13
Greater Yellowlegs	5
Little Blue Heron	4
Great Blue Heron	2
Great Egret	2
Marsh Hawk	2
Belted Kingfisher	2
Horned Grebe	1
Snowy Egret	1
Louisiana Heron	1
American Green-winged Teal	1
Common Goldeneye	1
American Kestrel	1
Killdeer	1
Forester's Tern	1

Table 2.7-36 (Continued)

Species	Birds/Hour
Birds Observed in the Area but not During the Counts	
Fish Crow	
Anhinnga	
American Coot	
Swamp Sparrow	

Table 2.7-37 Birds of the Suwannee River Mine's Active Settling Area.

Species	Birds/Hour
American Coot	758
Red-winged Blackbird	321
Great Egret	179
Great Blue Heron	92
Double-crested Cormorant	61
Pied-billed Grebe	39
Northern Shoveler	33
Blue-winged Teal	26
Ring-billed Gull	26
Anhinnga	19
Turkey Vulture	17
Tree Swallow	10
Common Gallinule	7
Bald Eagle	3
Ring-necked Duck	3
Killdeer	3
Red-tailed Hawk	2
Belted Kingfisher	2
Common Crow	2
Boat-tailed Grackle	2
Little Blue Heron	1

Table 2.7-37 (Continued)

Species	Birds/Hour
Black-crowned Night Heron	1
White Ibis	1
Marsh Hawk	1
Birds Observed in Habitat But Not During Counts	
Horned Grebe	
White Pelican	
Cattle Egret	
Snowy Egret	
Louisiana Heron	
Mallard	
Black Duck	
Common Teal (American)	
American Wigeon	
Redhead	
Canvasback	
Common Goldeneye	
Bufflehead	
Ruddy Duck	
Hooded Merganser	
Red-breasted Merganser	
Sharp-shinned Hawk	

Table 2.7-37 (Continued)

Species	Birds/Hour
Birds Observed in Habitat But Not During Counts (Cont'd)	
Cooper's Hawk	
Red-shouldered Hawk	
Peregrine Falcon	
American Kestrel	
Common Snipe	
Mourning Dove	
Eastern Phoebe	
Yellow-rumped Warbler	

Table 2.7-38 Birds of the Suwannee River Mine's Inactive Settling Area.

Species	Birds/Hour
American Coot	31
American Wigeon	30
Swamp Sparrow	15
Blue-winged Teal	9
Green-winged Teal	7
Song Sparrow	7
Gadwal	6
Red-winged Blackbirds	6
Pied-billed Grebe	4
Wood Duck	4
Yellow-rumped Warbler	4
White Ibis	3
Savannah Sparrow	3
Great Blue Heron	2
Red-tailed Hawk	2
Marsh Hawk	2
Ring-billed Gull	2
Anhinnga	1
Great Egret	1
Snowy Egret	1
American Bittern	1

Table 2.7-38 (Continued)

Species	Bird/Hour
Mallard	1
Ring-necked Duck	1
Red-shouldered Hawk	1
Belted Kingfisher	1
Eastern Phoebe	1
Gray Catbird	1
Observed Birds in Area but not During Counts	
Double-crested Cormorant	
Little Blue Heron	
Louisiana Heron	
Black-crowned Night Heron	
Northern Shoveler	
Turkey Vulture	
Sharp-shinned Hawk	
Cooper's Hawk	
American Kestrel	
Killdeer	
Greater Yellowlegs	
Lesser Yellowlegs	
Least Sandpiper	
Durlin	

Table 2.7-38 (Continued)

Species	Birds/Hour
Observed Birds in Area but not During Counts (Cont'd)	
Dowitcher sp.	
Common Flicker	
Boat-tailed Grackle	

Table 2.7-39 Birds of the Suwannee River Mine's Reclaimed Area.

Species	Birds/Hour
Ring-billed Gull	452
Great Egret	216
Double-crested Cormorant	113
Red-winged Blackbird	106
Bonaparte's Gull	75
American Coot	45
Turkey Vulture	30
Herring Gull	28
Anginnga	27
Boat-tailed Grackle	25
Wood Stork	22
Great Blue Heron	18
Hooded Merganser	14
Pied-billed Grebe	13
Black-crowned Night Heron	9
Blue-winged Teal	5
Snowy Egret	4
Beleted Kingfisher	4
Northern Shoveler	3
Wood Duck	3
Killdeer	3
Song Sparrow	3

Table 2.7-39 (Continued)

Species	Birds/Hour
Common Loon	2
Ring-necked Duck	2
House Wren	2
Savannah Sparrow	2
Little Blue Heron	1
White-crowned Sparrow	1
Red-tailed Hawk	1
Birds Observed in Habitat but Not on Points	
Horned Grebe	
White Pelican	
Cattle Egret	
White Ibis	
Canada Goose	
Mallard	
Gadwall	
American Wigeon	
Lesser Scaup	
Bufflehead	
Ruddy Duck	
Red-breasted Merganser	
Black Vulture	

Table 2.7-39 (Continued)

Species	Birds/Hour
Birds Observed in Habitat but Not on Points (Cont'd)	
Red-shouldered Hawk	
Bald Eagle	
Marsh Hawk	
American Kestrel	
Common Snipe	
Greater Yellowlegs	
Lesser Yellowlegs	
Least Sandpiper	
Dowitcher sp.	
Common Flicker	
Eastern Phoebe	
Mockingbird	
Gray Catbird	
Loggerhead Shrike	
Eastern Meadowlark	
Swamp Sparrow	

Table 2.7-40 Birds of the Mined Lands of the Suwannee River Mine.

Species	Birds/Hour
Red-winged Blackbird	57
Yellow-rumped Warbler	18
Eastern Phoebe	3
Common Yellowthroat	3
Swamp Sparrow	3
Red-tailed Hawk	2
Killdeer	2
Common Crow	2
House Wren	2
Mockingbird	2
Savannah Sparrow	2
Song Sparrow	2
Great Blue Heron	1
Great Egret	1
Turkey Vulture	1
Red-shouldered Hawk	1
Common Snipe	1
Eastern Meadowlark	1
Boat-tailed Grackle	1

Table 2.7-40 (Continued)

Species	Birds/Hour
Birds Observed in Habitat but not During Counts	
Pied-billed Grebe	
Anhinnga	
Marsh Hawk	
American Coot	
Fish Crow	
Yello-rumped Warbler	
White-throated Sparrow	

Table 2.7-41 Endangered, Threatened, and Rare Species of Animals and Their Respective Status.

	Protected			Listed						
Common Name/Scientific Name	USA	FLA	GA	FCREPA	GESC	SEWS	AOU	AB	SSAR	AFS
Mammals										
Florida Panther (*Felis concolor coryi*)	E	E	E	E	E	E	--	--	--	--
Gray Bat (*Myotis grisescens*)	E	E	E	E	RU	T	--	--	--	--
Manatee (*Trichechus manatus*)	E	T	E	T	E	E	--	--	--	--
Sherman's Fox Squirrel (*Sciurus niger shermani*)	--	T	--	T	--	T	--	--	--	--
Florida Mouse (*Peromyscus floridanus*)	--	T	--	T	--	T	--	--	--	--
Florida Black Bear (*Ursus americanus floridanus*)	--	T	--	T	--	T	--	--	--	--
Southern Mink (*Mustela vison mink*)	--	--	--	R	--	SC	--	--	--	--
Southeastern Weasel (*Mustela frenata olivacea*)	--	--	--	R	SU	--	--	--	--	--
Round-tailed Muskrat (*Neofiber alleni*)	--	--	--	SC	E	SC	--	--	--	--

Table 2.7-41 (Continued)

Common Name/Scientific Name	Protected			Listed						
	USA	FLA	GA	FCREPA	GESC	SEWS	AOU	AB	SSAR	AFS
Big Brown Bat (*Eptesicus fuscus*)	--	--	--	R	--	--	--	--	--	--
Hoary Bat (*Vasiurus cinereus cinereus*)	--	--	--	R	SU	--	--	--	--	--
Southeastern Big-eared Bat (*Plecotus rafinesquii*)	--	--	--	R	--	SC	--	--	--	--
Birds										
Southern Bald Eagle (*Haliaeetus l. leucocephalus*)	E	T	E	T	E	E	SU	--	--	--
Peregrine Falcon (*Falco peregrinus*)	E	E	E	E	E	E	E	--	--	--
Wood Stork (*Mycteria americana*)	--	E	--	E	T	T	--	BL	--	--
Ivory-billed Woodpecker (*Campephilus principalus*)	E	E	E	E	E	E	E	--	--	--
Red-cockaded Woodpecker (*Picoides borealis*)	E	E	E	E	E	E	E	--	--	--
Bachman's Warbler (*Vermivora bachmanii*)	E	E	E	E	E	E	E	--	--	--

Table 2.7-41. (Continued)

Common Name/Scientific Name	Protected			Listed						
	USA	FLA	GA	FCREPA	GESC	SEWS	AOU	AB	SSAR	AFS
Osprey (Pandion haliaetus)	--	T	--	T	RU	--	--	BL	--	--
Southeastern Kestrel (Falco sparverius paulus)	--	T	--	T	--	SU	--	--	--	--
Florida Sandhill Crane (Grus canadensis pratensis)	--	T	--	T	T	T	--	BL	--	--
Least Tern (Sterna albifrons)	--	T	--	T	--	SC	--	BL	--	--
Louisiana Waterthrush (Serius motacilla)	--	--	--	R	--	--	--	--	--	--
American Redstart (Setrophaga roticilla)	--	--	--	R	--	--	--	--	--	--
Little Blue Heron (Florida caerulea)	--	--	--	SC	--	--	--	--	--	--
Great Egret (Casmeriodus albus)	--	--	--	SC	--	--	--	--	--	--
Snowy Egret (Egretta thula)	--	--	--	SC	--	--	--	--	--	--
Louisiana Heron (Hydranassa tricolor)	--	--	--	SC	--	--	--	--	--	--

Table 2.7-41 (Continued)

Common Name/Scientific Name	Protected			Listed						
	USA	FLA	GA	FCREPA	GESC	SEWS	AOU	AB	SSAR	AFS
Black-crowned Night Heron (*Nycticorax nycticorax*)	--	--	--	SC	--	--	--	BL	--	--
Yellow-crowned Night Heron (*Nyctanassa violacea*)	--	--	--	SC	--	--	--	--	--	--
Least Bittern (*Ixobrychus exilis*)	--	--	--	SC	--	--	--	--	--	--
White Ibis (*Eudocimus albus*)	--	--	--	SC	--	--	--	BL	--	--
Coopers Hawk (*Accipiter cooperii*)	--	--	--	SC	RU	SC	--	BL	--	--
Caspian Tern (*Sterna caspia*)	--	--	--	SC	--	--	--	--	--	--
Hairy Woodpecker (*Picoides villosus*)	--	--	--	SC	--	--	--	BL	--	--
White-breasted Nuthatch (*Sitta carolinensis*)	--	--	--	SC	--	--	--	--	--	--
Worm-eating Warbler (*Helmitheros vermivorus*)	--	--	--	SC	--	--	--	--	--	--
Merlin (*Falco columbarius*)	--	--	--	SU	--	SU	--	BL	--	--

Table 2.7-41 (Continued)

Common Name/Scientific Name	Protected			Listed						
	USA	FLA	GA	FCREPA	GESC	SEWS	AOU	AB	SSAR	AFS
Reptiles										
American Alligator (*Alligator mississippiensis*)	E,T	T	E	SC	E	SC	--	--	T	--
Short-tailed Snake (*Stilosoma extenuatum*)	--	E	--	E	--	E	--	--	E	--
Suwannee Cooter (*Chrysemys concinna suwanniensis*)	--	T	--	T	RU	T	--	--	T	--
Gopher Tortoise (*Gopherus polyphemus*)	--	T	--	T	T	T	--	--	T	--
Spotted Turtle (*Clemmys guttata*)	--	--	--	R	T	--	--	--	PR	--
Indigo Snake (*Drymarchon corais couperi*)	T	T	T	SC	E	T	--	--	E	--
Alligator Snapping Turtle (*Macroclemys temmincki*)	--	--	--	SU	--	SC	--	--	R	--
Amphibians										
Florida Gopher Frog (*Rana areolata aesopus*)	--	T	--	R	RU	--	--	--	PR	--
Many-lined Salamander (*Stereochilus marginatus*)	--	--	--	R	RU	SU	--	--	T	--

Table 2.7-41 (Continued)

Common Name/Scientific Name	Protected			Listed						
	USA	FLA	GA	FCREPA	GESC	SEWS	AOU	AB	SSAR	AFS
Striped Newt (*Notopthalmus perstriatus*)	--	--	--	R	--	--	--	--	PR	--
Carpenter Frog (*Rana virgatipes*)	--	--	--	T	RU	T	--	--	T	--
Fish										
Atlantic Sturgeon (*Acipenser oxyrhynchus*)	--	T	--	T	SU	--	--	--	--	D
Eastern Mudminnow (*Umbra pygmaea*)	--	--	--	R	--	--	--	--	--	--
Mud Sunfish (*Acantharchus pomotis*)	--	--	--	R	--	--	--	--	--	--
Black-banded Sunfish (*Enneacanthus chaetodon*)	--	--	--	R	RU	--	--	--	--	--
Suwannee Bass (*Micropterus notius*)	--	T	--	R	SU	--	--	--	--	R

Legend

Protected
USA = United States Department of the Interior, 1976. United States List of Endangered and Threatened Fauna. October 1976. U.S. Fish and Wildlife Service, Department of the Interior, Washington, D.C.

Table 2.7-41 (Continued)

Common Name/Scientific Name	USA	FLA	GA	FCREPA	GESC	SEWS	AOU	AB	SSAR	AFS

Legend (Cont'd)

FLA = Florida Game and Fresh Water Fish Commission, 1977. Wildlife Code of the State of Florida. Florida Game and Fresh Water Fish Commission, Tallahassee.

GA = Georgia Department of Natural Resources, 1977. Game and Fish Division, Atlanta.

Listed

FCREPA= Florida Committee on Rare and Endangered Plants and Animals.
Layne, J.N. (ed.), 1976. Inventory of rare and endangered biota of Florida. Florida Audobon Society. Florida Defenders of the Environment. Microfilm.

GESC = Georgia Endangered Species Committee.
McCollum, J.L. (ed.), 1974. Endangered species of Georgia. Georgia Department of Natural Resources, Atlanta. 66 pp.

SEWS = Endangered Species Workshop, Southeastern Section of the Wildlife Society.
Hillestad, H.L., D.B. Means, and W.W. Baker, eds. In press. Endangered and threatened vertebrates of the southeastern United States. Tall Timbers Research Station Miscellaneous Publication No. 4.

AOU = American Ornithologist's Union.
American Ornithologist's Union. 1975. Reprot of the Committee on Conservation. Auk 92:16-166.

AB = American Birds, The Blue List
American Birds. 1976. The Blue List for 1977. American Birds 30(6):1031-1039.

SSAR = Society for the Study of Amphibians and Reptiles.
Ashton, R.E., Jr. 1974. Endangered and threatened amphibians and reptiles in the United States. Society for the Study of Amphibians and Reptiles. 65 pp.

Table 2.7-41 (Continued)

Common Name/Scientific Name	Protected			Listed						
	USA	FLA	GA	FCREPA	GESC	SEWS	AOU	AB	SSAR	AFS

Legend (Cont'd)

AFS = American Fisheries Society.
Miller, R.R. 1972. Threatened freshwater fishes of the United States. Transactions American Fisheries Society. 101(2): 239-252.

E = Endangered
T = Threatened
R = Rare
SC = Special concern
SU = Status undetermined
RU = Rare or unusual
PR = Peripheral
D = Depleted
BL = Blue list species whose numbers are substantially reduced

Table 2.7-42 Summary of Occurrence of Rare and Endangered Species.

Taxon	Number Probable	Number Confirmed	Number Potential	Number Not Occurring
Mammals	12	4	6	2
Birds	26	16	8	2
Reptiles	7	3	3	1
Amphibians	4	--	3	1
Fish	5	3	1	1
Total	54	26	21	7

Table 2.7-43 Listed Species Utilizing the Heron Rookery On Active Settling Area 8, Suwannee River Mine, Summer of 1977.

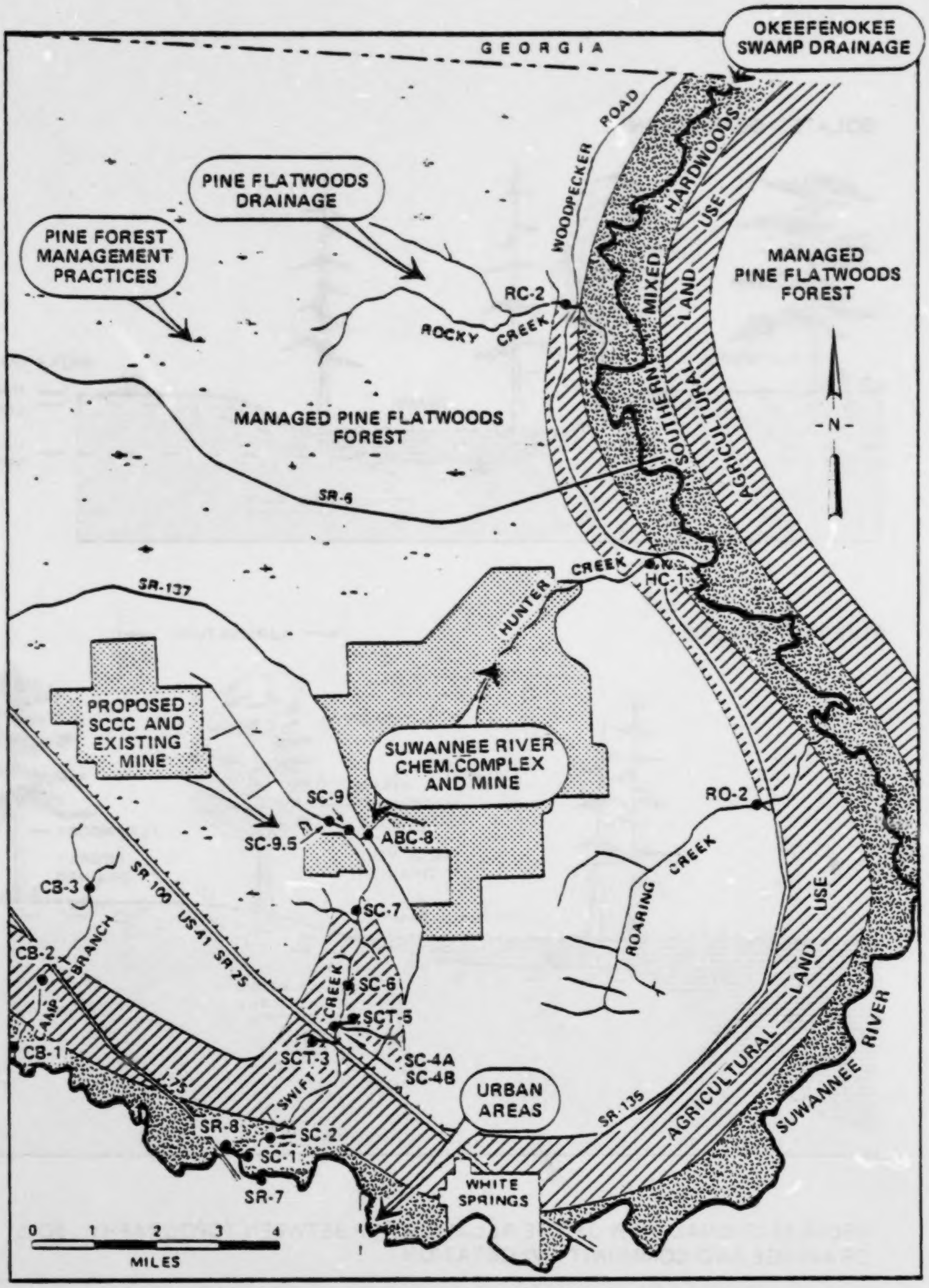
Species	Number of Pairs
Great Egret	150
Snowy Egret	1,000
Little Blue Heron	200
Black-crowned Night Heron	75
White Ibis	2,500

Table 2.7-44 Census of Listed Bird Species of the Suwannee River Mine Areas Observed On 16 November, 1977.

Species	Reclaimed Area	Inactive Settling Area	Active Settling Area	Mined Lands	Total
Great Egret	118	62	137	1	308
Snowy Egret	11	50	1	--	62
Wood Stork	1	--	--	--	1
Little Blue Heron	2	3	2	--	7
Black-crowned Night Heron	--	--	49	--	49
Kestrel (subspecies unknown)	--	1	2	--	3
Louisiana Heron	--	2	--	--	2
Bald Eagle	--	--	1	--	1
Peregrine Falcon	--	--	1	--	1
Cooper's Hawk	--	--	1	--	1

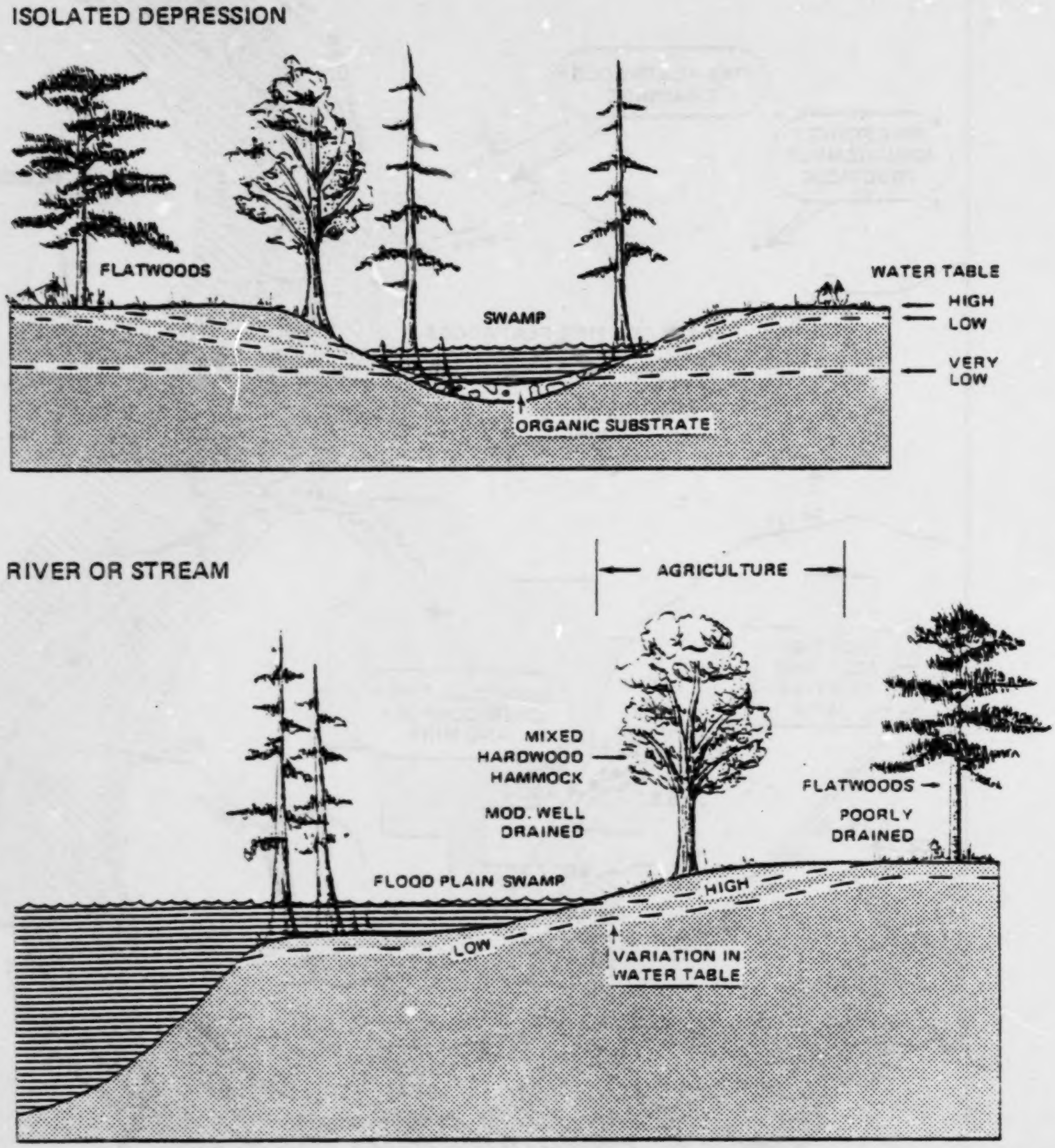
Table 2.7-45 Agricultural Statistics for Hamilton County, 1977

CROPS				LIVESTOCK		
Crop	Acreage	Yield	Total Value	Type	Amount	Value
Corn	31,685	10 Bu/acre	$475,000.00	Poultry	50 boiler houses: 600,000 capacity;	$2,500,000.00
Tobacco	1,581 alloted	3,560,000 lbs.	$4,550,000.00		4 lager houses: 48,000 capacity;	
Cotton	787 alloted	0	0		9 pullet houses: 100,000 capacity.	
Peanuts	128	3,300 lb/acre	$84,400.00	Hogs	12,000 head on 110 farms	$900,000.00
Soybeans	600	28 Bu/acre	$116,000.00	Cattle	10,000 beef on 240 farms;	$600,000.00
Rye	7500	--	--		700 dairy on 1 farm.	
Millet	2000	--	--			
Rye Grass	200	--	--			
Clover	100	--	--			
Hay	1500	8 tons/acre	$60,000.00			


GEORGIA
OKEEFENOKEE SWAMP DRAINAGE
WOODPECKER ROAD
PINE FLATWOODS DRAINAGE
PINE FOREST MANAGEMENT PRACTICES
MIXED HARDWOODS
SOUTHERN
LAND USE
AGRICULTURAL
MANAGED PINE FLATWOODS FOREST
RC-2
ROCKY CREEK
MANAGED PINE FLATWOODS FOREST
N
SR-6
SR-137
HUNTER CREEK
HC-1
PROPOSED SCCC AND EXISTING MINE
SUWANNEE RIVER CHEM.COMPLEX AND MINE
RO-2
SC-9
SC-9.5
ABC-8
ROARING CREEK
CB-3
SR 100 US 41 SR 25
SC-7
CB-2
CAMP BRANCH
SC-6
SCT-5
CREEK
CB-1
SCT-3
SC-4A
SC-4B
SWIFT
I-75
URBAN AREAS
SR-135
AGRICULTURAL LAND USE
SUWANNEE RIVER
SR-8
SC-2
SC-1
SR-7
WHITE SPRINGS
0 1 2 3 4
MILES

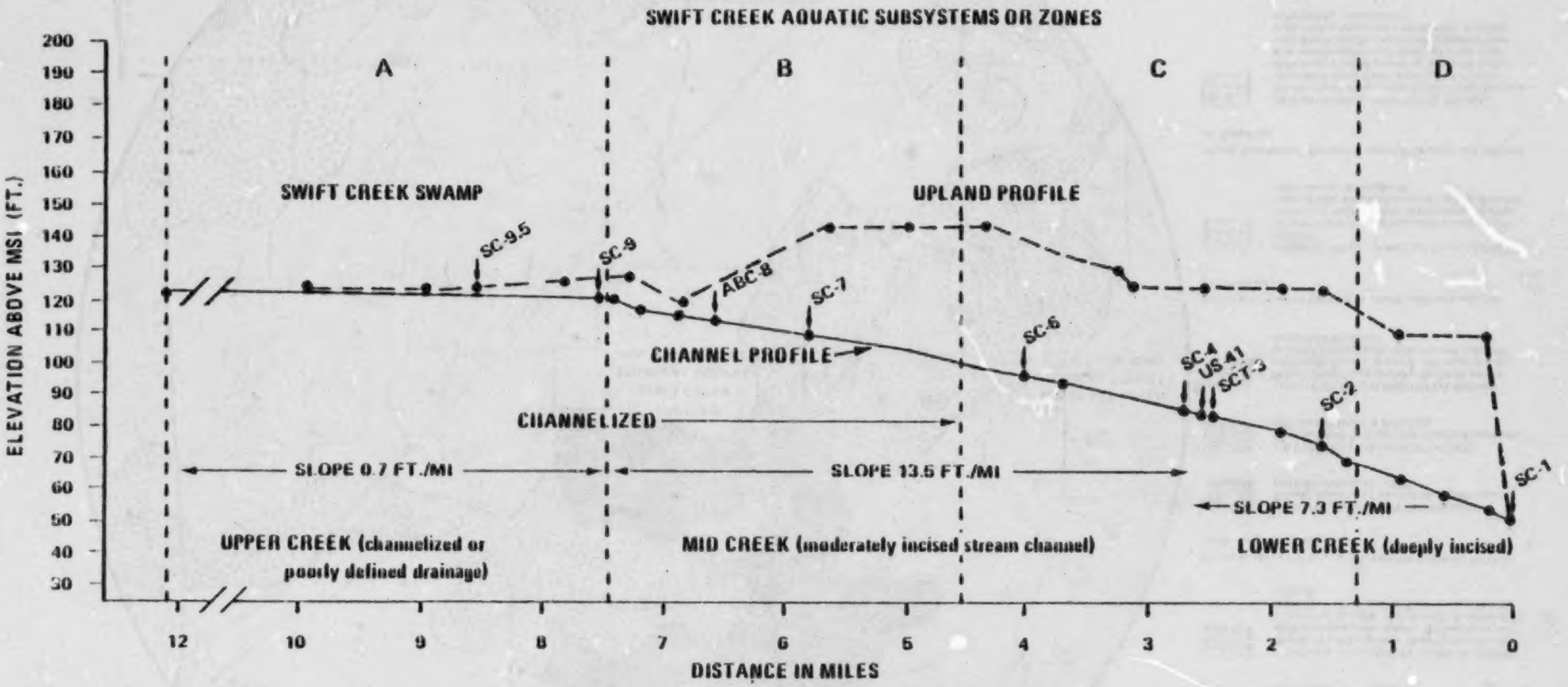
MAJOR FORCING FUNCTIONS AND COMPONENTS OF THE OCCIDENTAL AREA ECOSYSTEM AND SAMPLING STATIONS

FIGURE 2.7-1


ISOLATED DEPRESSION
FLATWOODS
SWAMP
WATER TABLE
HIGH
LOW
VERY LOW
ORGANIC SUBSTRATE
RIVER OR STREAM
AGRICULTURE
MIXED HARDWOOD HAMMOCK
MOD. WELL DRAINED
FLATWOODS
POORLY DRAINED
FLOOD PLAIN SWAMP
HIGH
LOW
VARIATION IN WATER TABLE

CROSS SECTIONAL VIEW OF THE RELATIONSHIP BETWEEN TOPOGRAPHY , SOIL DRAINAGE AND COMMUNITY VEGETATION

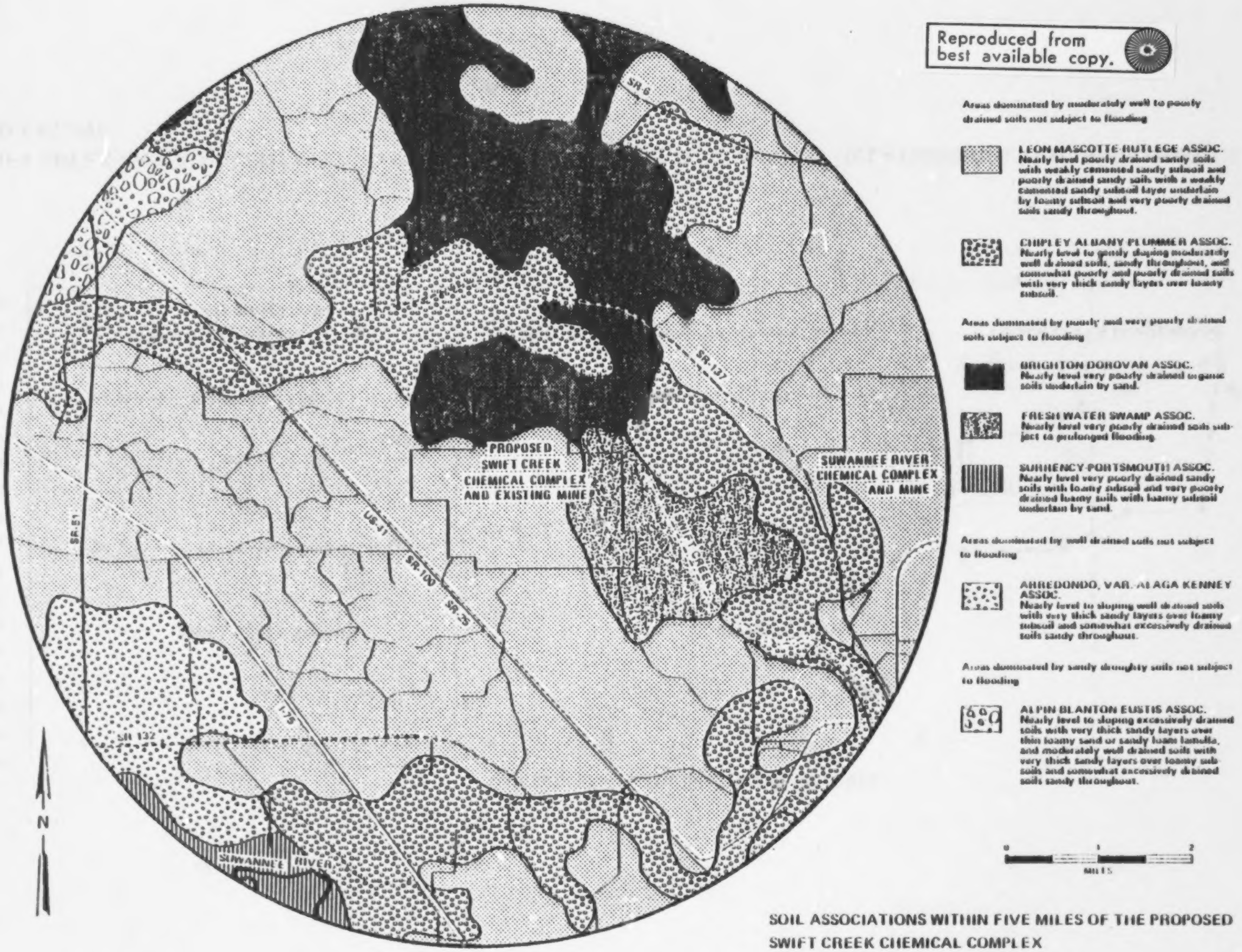
FIGURE 2.7-2



SWIFT CREEK AND ADJACENT UPLAND PROFILE SHOWING STREAM SUBSYSTEM RELATIONSHIPS, CHARACTERISTICS AND EXTENT

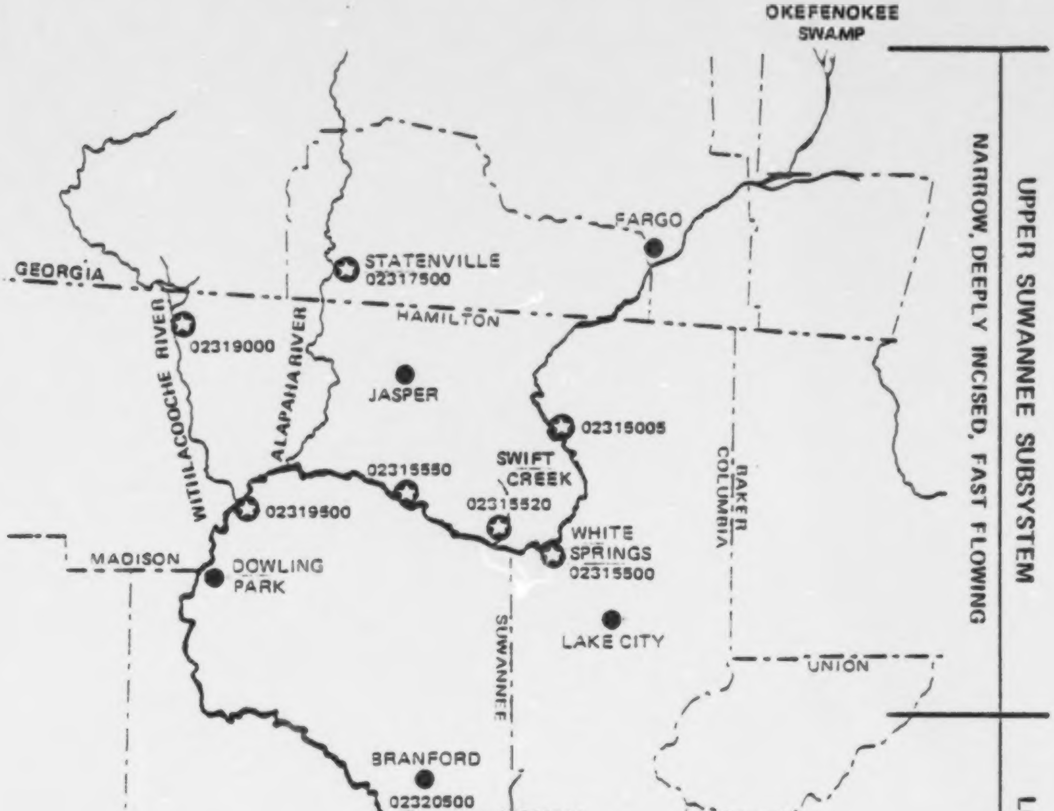
FIGURE 2.7-3

Reproduced from
best available copy.


SR 6
SR 137
PROPOSED SWIFT CREEK CHEMICAL COMPLEX AND EXISTING MINE
SUWANNEE RIVER CHEMICAL COMPLEX AND MINE
SWIFT CREEK
US 41
SR 100
SR 25
I-75
SR 51
SR 132
SUWANNEE RIVER
N
Areas dominated by moderately well to poorly drained soils not subject to flooding
LEON MASCOTTE RUTLEGE ASSOC. Nearly level poorly drained sandy soils with weakly cemented sandy subsoil and poorly drained sandy soils with a weakly cemented sandy subsoil layer underlain by loamy subsoil and very poorly drained soils sandy throughout.
CHIPLEY ALBANY PLUMMER ASSOC. Nearly level to gently sloping moderately well drained soils, sandy throughout, and somewhat poorly and poorly drained soils with very thick sandy layers over loamy subsoil.
Areas dominated by poorly and very poorly drained soils subject to flooding
BRIGHTON DOROVAN ASSOC. Nearly level very poorly drained organic soils underlain by sand.
FRESH WATER SWAMP ASSOC. Nearly level very poorly drained soils subject to prolonged flooding.
SURRENCY-PORTSMOUTH ASSOC. Nearly level very poorly drained sandy soils with loamy subsoil and very poorly drained loamy soils with loamy subsoil underlain by sand.
Areas dominated by well drained soils not subject to flooding
ARREDONDO, VAR. ALAGA KENNEY ASSOC. Nearly level to sloping well drained soils with very thick sandy layers over loamy subsoil and somewhat excessively drained soils sandy throughout.
Areas dominated by sandy droughty soils not subject to flooding
ALPIN BLANTON EUSTIS ASSOC. Nearly level to sloping excessively drained soils with very thick sandy layers over thin loamy sand or sandy loam lamella, and moderately well drained soils with very thick sandy layers over loamy sub soils and somewhat excessively drained soils sandy throughout.
0
1
2
MILES

SOIL ASSOCIATIONS WITHIN FIVE MILES OF THE PROPOSED SWIFT CREEK CHEMICAL COMPLEX

FIGURE 2.74


OKEFENOKEE SWAMP
GEORGIA
FARGO
STATENVILLE 02317500
HAMILTON
02319000
WITHLACOOCHE RIVER
ALAPAHA RIVER
JASPER
02315005
02315550
SWIFT CREEK
02315520
02319500
WHITE SPRINGS 02315500
MADISON
DOWLING PARK
BAKER
COLUMBIA
SUWANNEE
LAKE CITY
UNION
BRANFORD
02320500
02322700
SANTE FE RIVER
BRADFORD
LAFAYETTE
DIXIE
BELL
ALACHUA
GILCHRIST
SUWANNEE RIVER
02323500
SUWANNEE RIVER
LEVY
MARION
SUWANNEE
VISTA
GULF OF MEXICO
0 5 10 15 20
MILES
U.S.G.S. GAGING STATION
UPPER SUWANNEE SUBSYSTEM
NARROW, DEEPLY INCISED, FAST FLOWING
LOWER SUWANNEE SUBSYSTEM
BROAD, FLAT, SLOW FLOWING
SUBSYSTEM
CHARACTER

U.S.G.S. STATIONS IN THE SUWANNEE RIVER BASIN

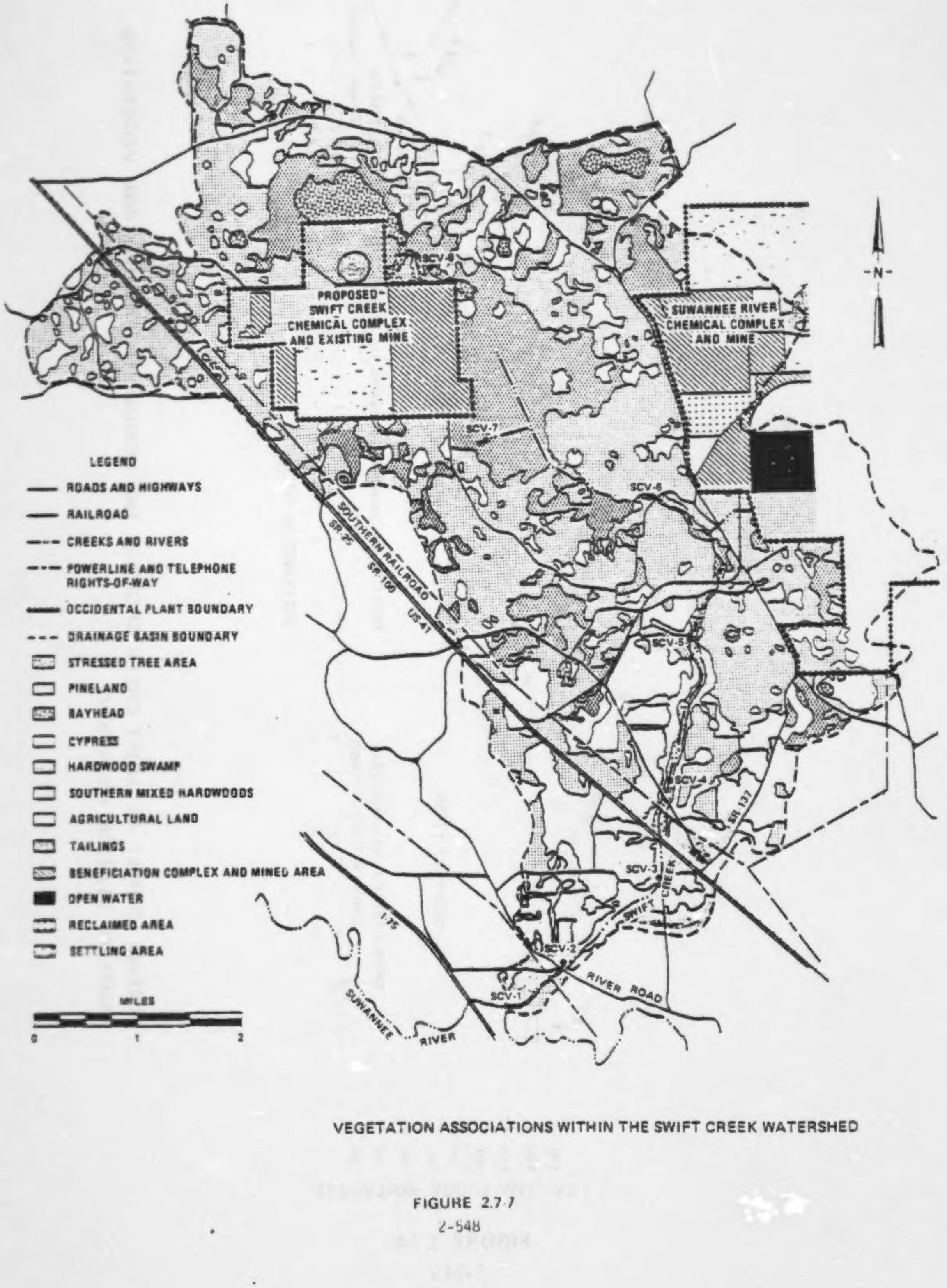
FIGURE 2.7-5

VEGETATION ASSOCIATIONS WITHIN FIVE MILES OF THE

PROPOSED SWIFT CREEK CHEMICAL COMPLEX

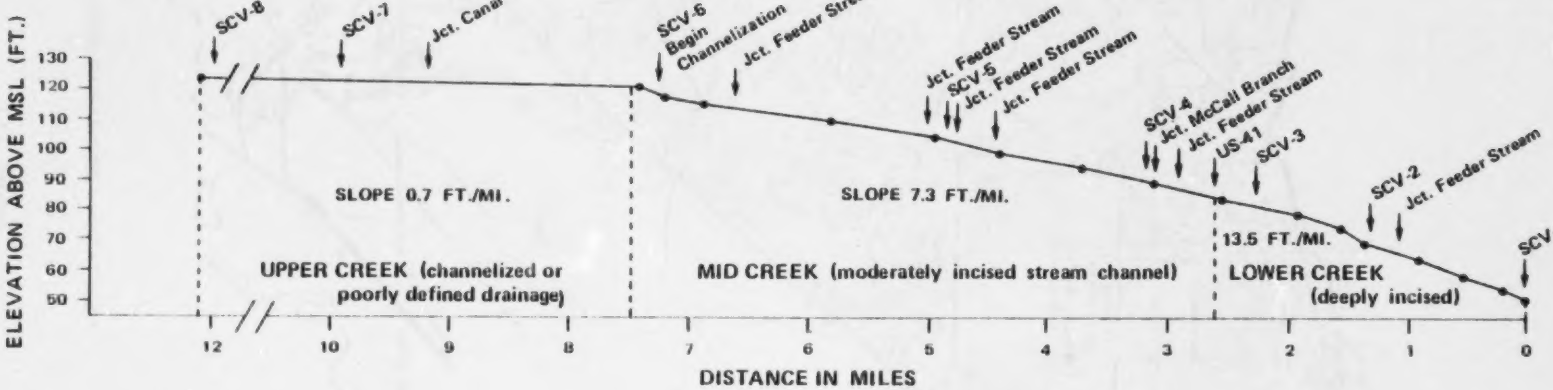
(See back of volume)

FIGURE 2.7-6


PROPOSED SWIFT CREEK CHEMICAL COMPLEX AND EXISTING MINE
SUWANNEE RIVER CHEMICAL COMPLEX AND MINE
-N-
SCV-8
SCV-7
SCV-6
SCV-5
SCV-4
SCV-3
SCV-2
SCV-1
SOUTHERN RAILROAD
SR-25
SR-100
US-41
SR 137
I-75
SWIFT CREEK
RIVER ROAD
SUWANNEE RIVER
LEGEND
ROADS AND HIGHWAYS
RAILROAD
CREEKS AND RIVERS
POWERLINE AND TELEPHONE RIGHTS-OF-WAY
OCCIDENTAL PLANT BOUNDARY
DRAINAGE BASIN BOUNDARY
STRESSED TREE AREA
PINELAND
BAYHEAD
CYPRESS
HARDWOOD SWAMP
SOUTHERN MIXED HARDWOODS
AGRICULTURAL LAND
TAILINGS
BENEFICIATION COMPLEX AND MINED AREA
OPEN WATER
RECLAIMED AREA
SETTLING AREA
MILES
0
1
2

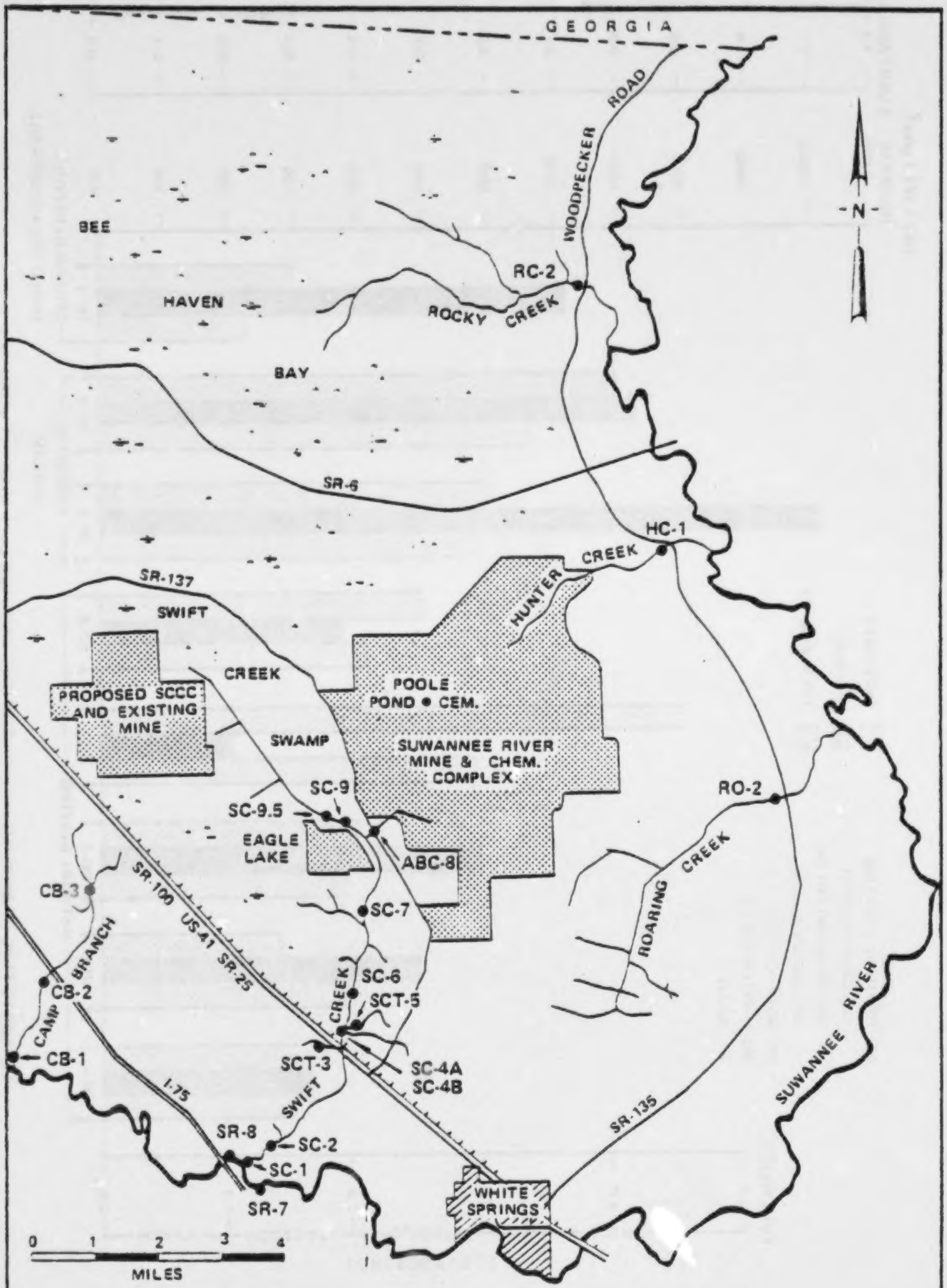
VEGETATION ASSOCIATIONS WITHIN THE SWIFT CREEK WATERSHED

FIGURE 2.7-7



STREAM PROFILE OF SWIFT CREEK SHOWING THE DOMINANT FEATURES AND VEGETATION SAMPLING STATION LOCATIONS

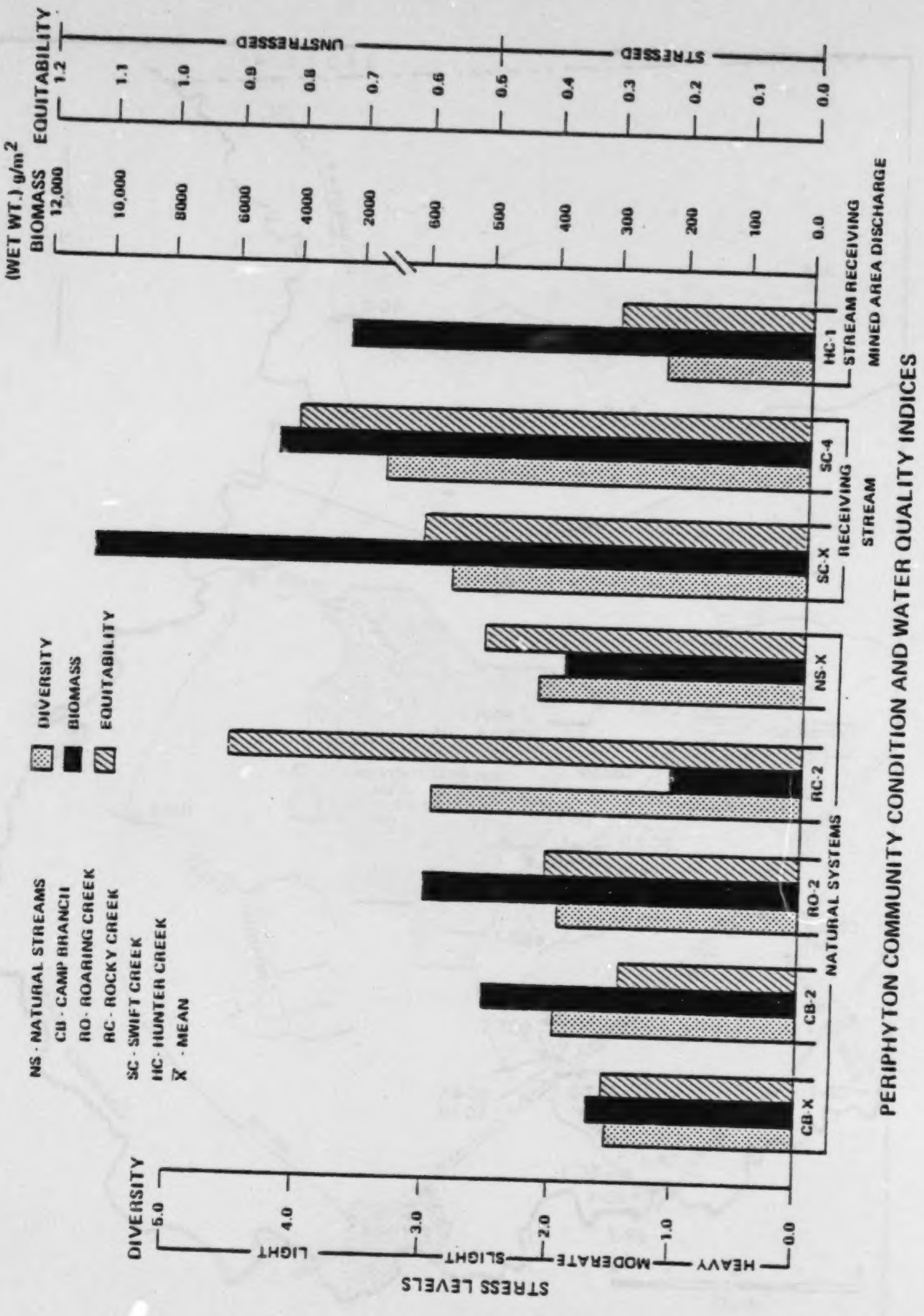
FIGURE 2.7-8



GEORGIA
WOODPECKER ROAD
N
BEE
HAVEN
BAY
RC-2
ROCKY CREEK
SR-6
HC-1
HUNTER CREEK
SR-137
SWIFT
CREEK
SWAMP
PROPOSED SCCC AND EXISTING MINE
POOLE POND
CEM.
SUWANNEE RIVER MINE & CHEM. COMPLEX
RO-2
ROARING CREEK
SC-9
SC-9.5
EAGLE LAKE
ABC-8
CB-3
SR-100
US-41
SR-25
SC-7
CAMP BRANCH
CB-2
CB-1
CREEK
SC-6
SCT-5
SCT-3
SC-4A
SC-4B
I-75
SWIFT
SR-8
SC-2
SC-1
SR-7
SR-135
SUWANNEE RIVER
WHITE SPRINGS
0 1 2 3 4
MILES

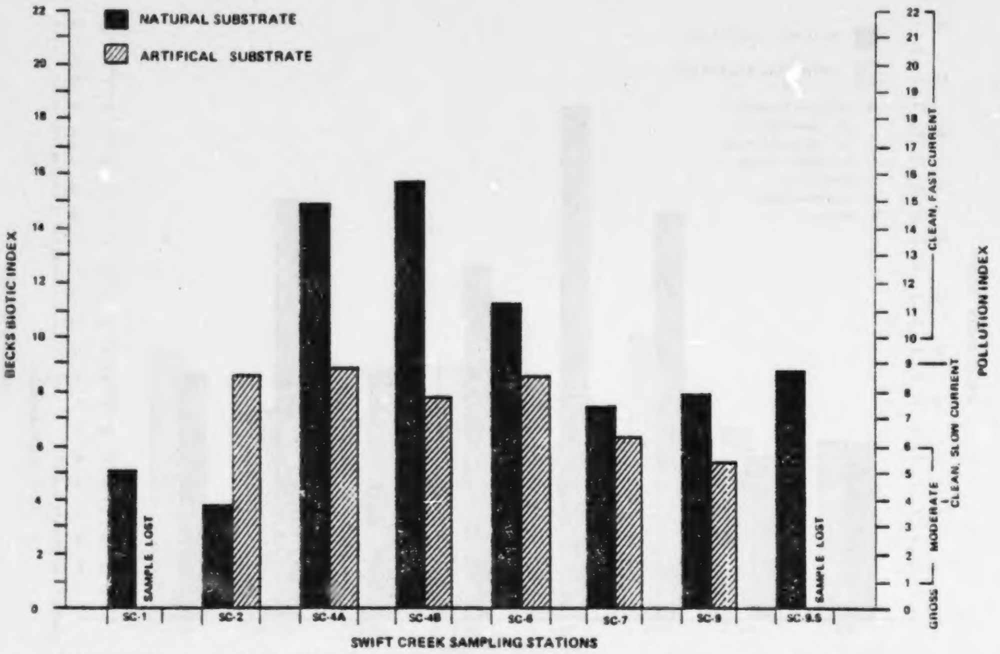
SAMPLING STATIONS IN THE STUDY AREA

FIGURE 2.7-9

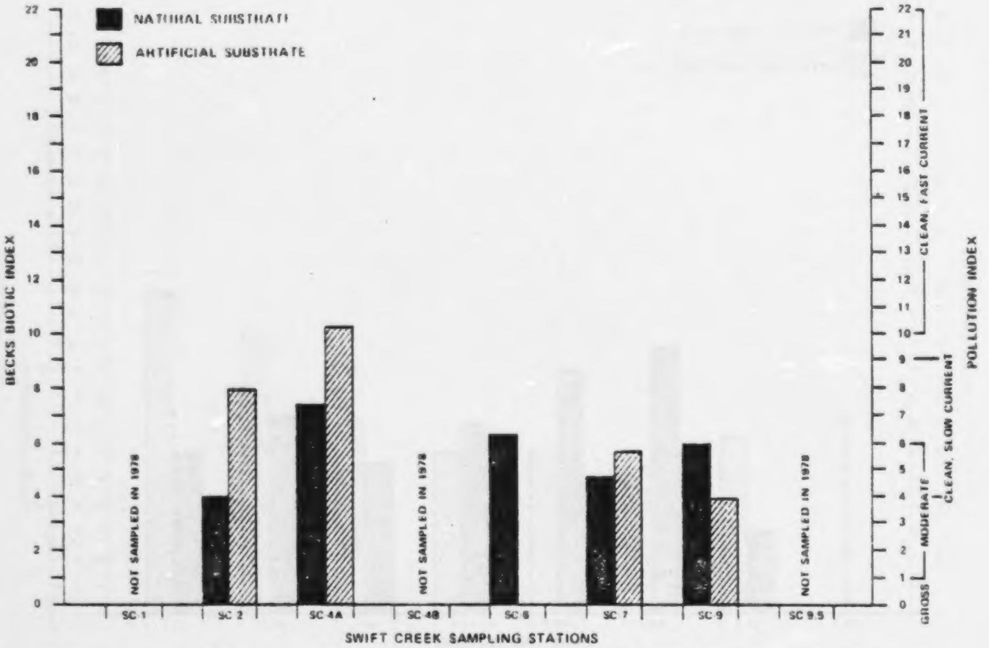


PERIPHYTON COMMUNITY CONDITION AND WATER QUALITY INDICES

FIGURE 2.7-10

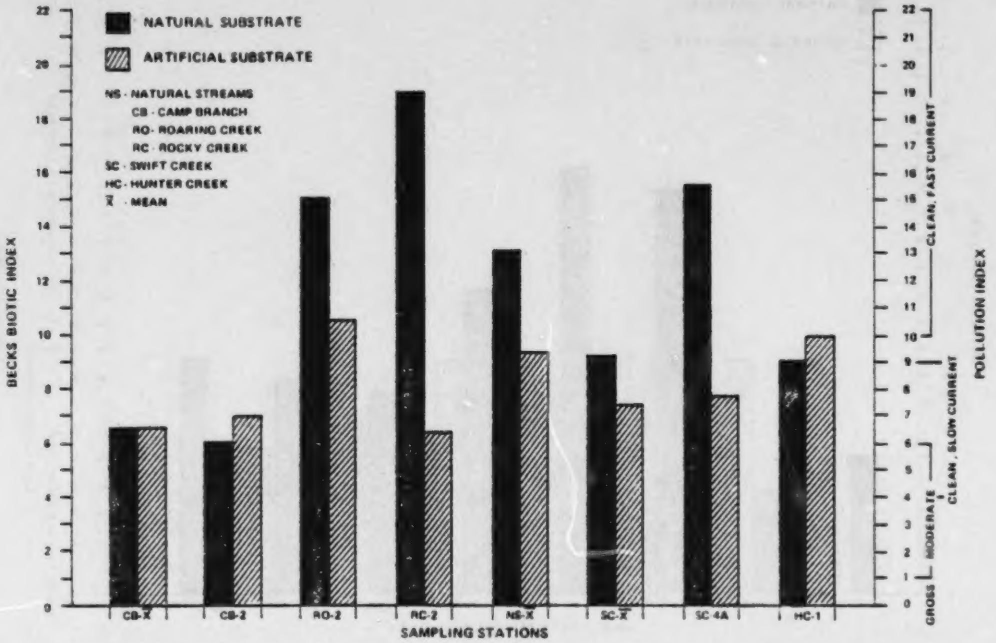


BECKS BIOTIC INDEX FOR MACROINVERTEBRATES COLLECTED FROM BOTTOM SEDIMENTS AND BY HESTER DENDYS IN SWIFT CREEK FROM THE FALL, 1977 SAMPLING PERIOD

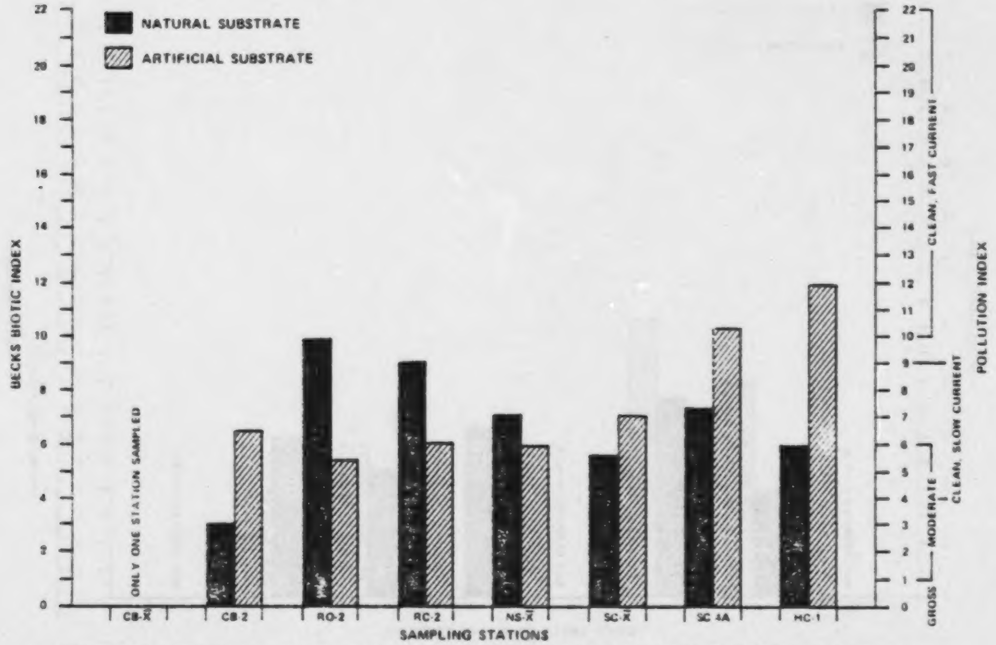


BECKS BIOTIC INDEX FOR MACROINVERTEBRATES COLLECTED FROM BOTTOM SEDIMENTS AND BY HESTER DENDYS IN SWIFT CREEK FROM THE WINTER, 1978 SAMPLING PERIOD

FIGURE 2.7-11

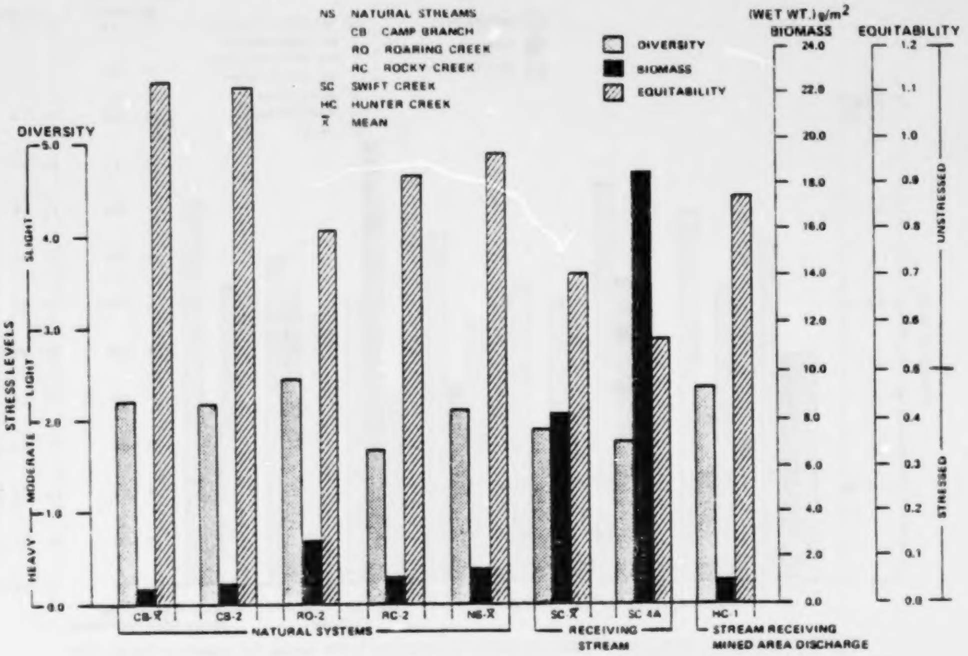


BECKS BIOTIC INDEX FOR MACROINVERTEBRATES COLLECTED FROM BOTTOM SEDIMENTS AND BY HESTER DENDYS IN AREA STREAMS FROM THE FALL, 1977 SAMPLING PERIOD

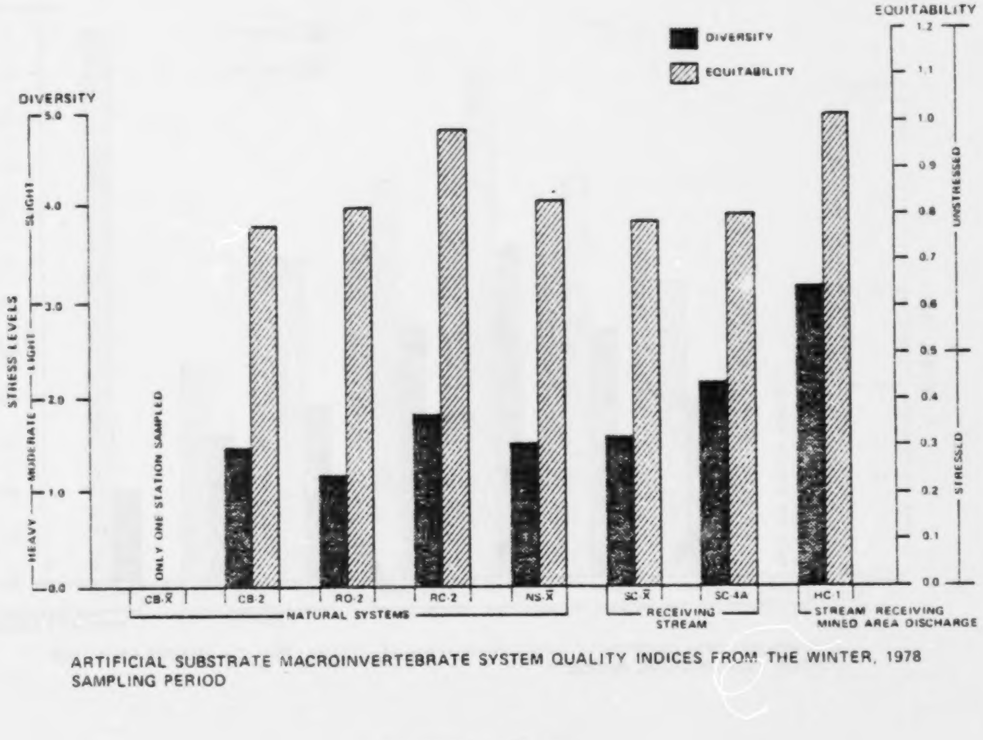


BECKS BIOTIC INDEX FOR MACROINVERTEBRATES COLLECTED FROM BOTTOM SEDIMENTS AND BY HESTER DENDYS IN AREA STREAMS FROM THE WINTER, 1978 SAMPLING PERIOD

FIGURE 2.7-12

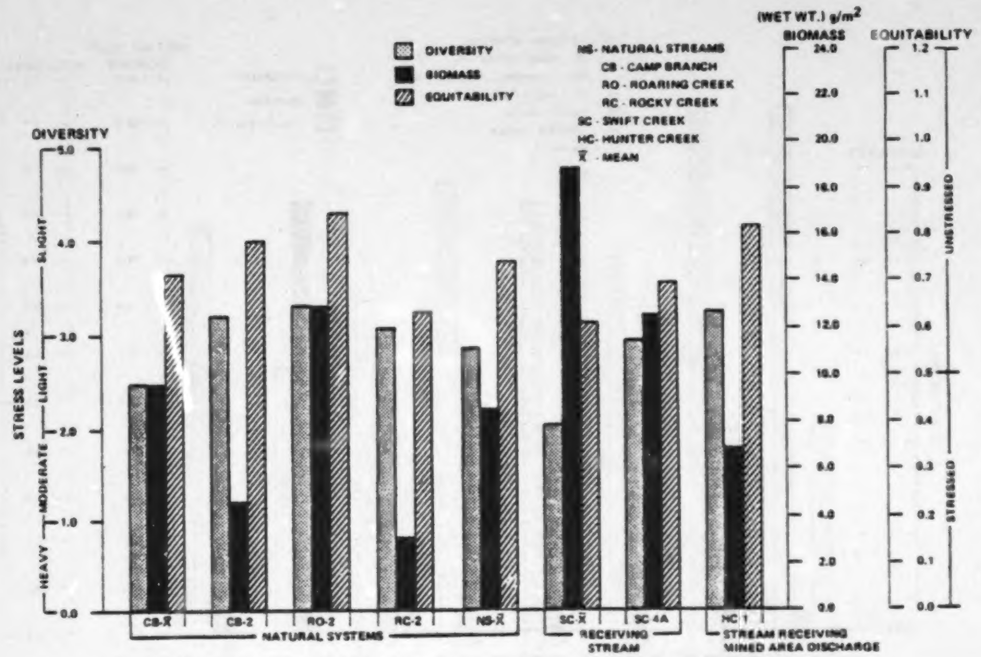


ARTIFICIAL SUBSTRATE MACROINVERTEBRATE SYSTEM QUALITY INDICES FROM THE FALL, 1977 SAMPLING PERIOD

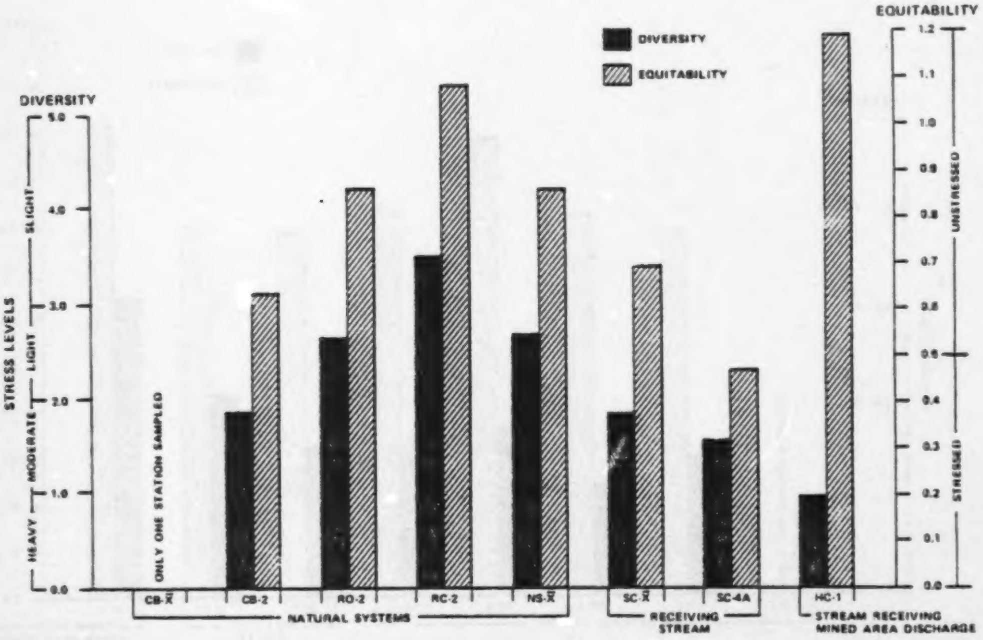


ARTIFICIAL SUBSTRATE MACROINVERTEBRATE SYSTEM QUALITY INDICES FROM THE WINTER, 1978 SAMPLING PERIOD

FIGURE 2.7-13

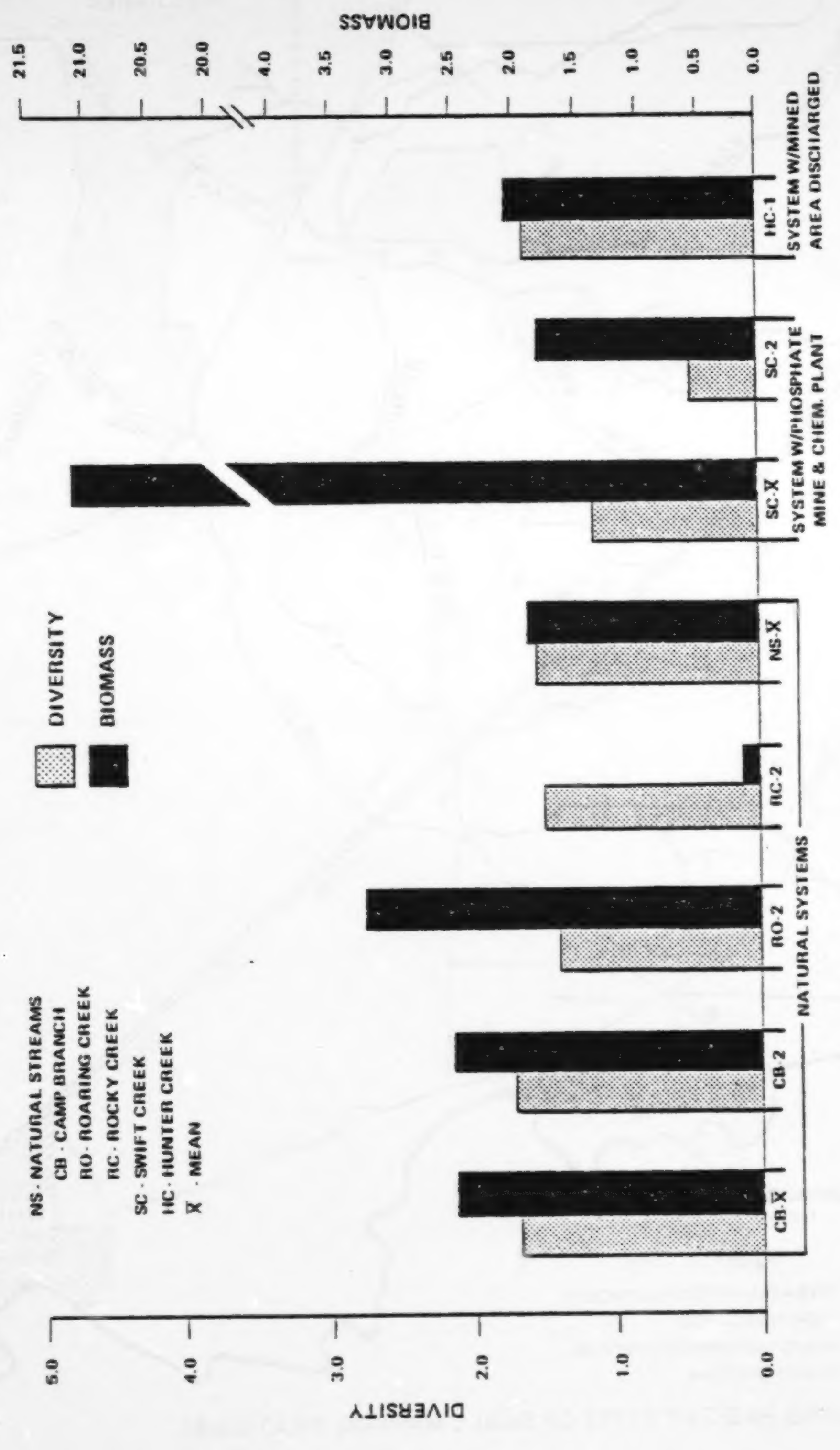


BENTHIC NATURAL SUBSTRATE MACROINVERTEBRATE SYSTEM QUALITY INDICES FROM THE FALL, 1977 SAMPLING PERIOD



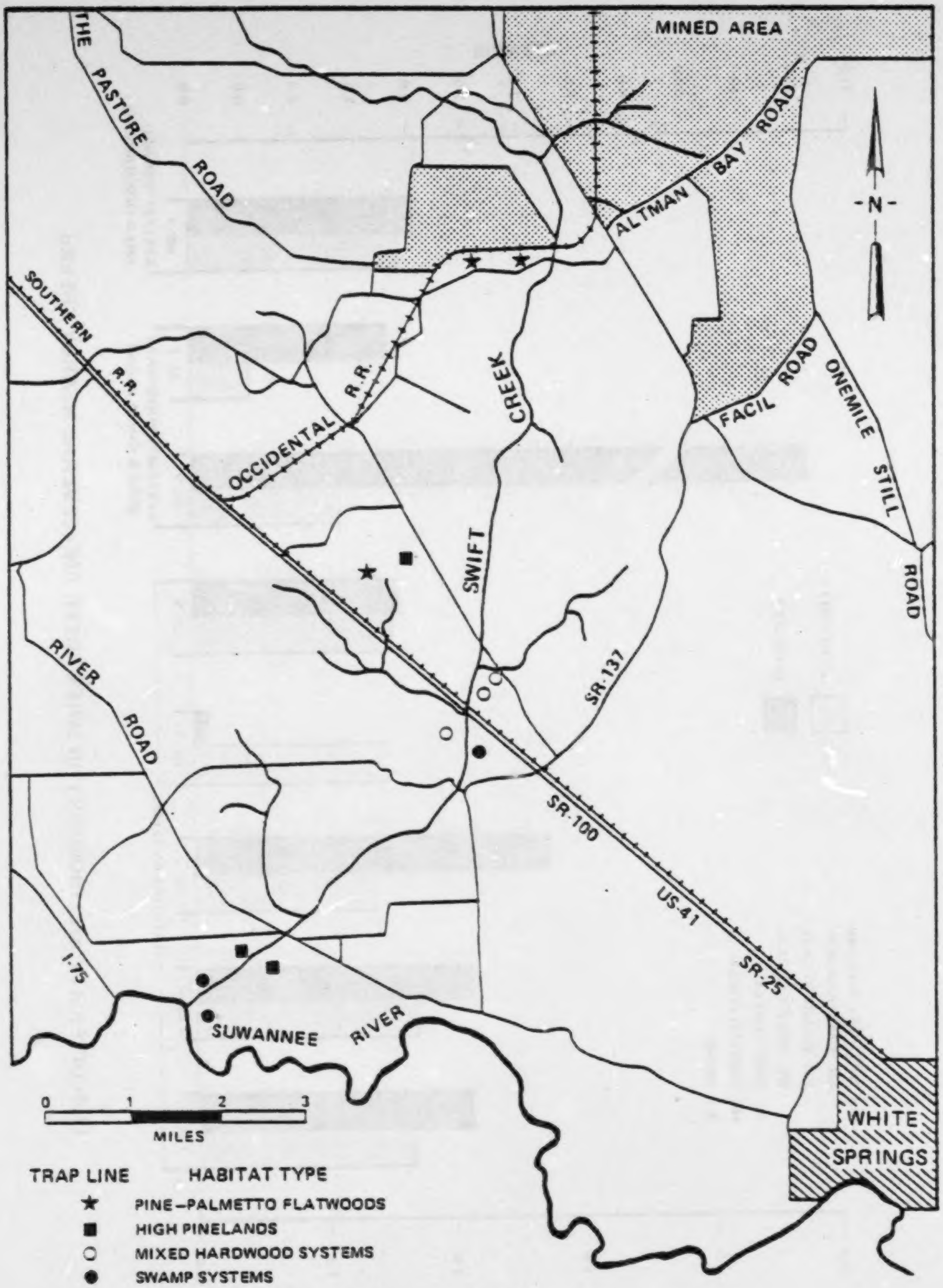
BENTHIC NATURAL SUBSTRATE MACROINVERTEBRATE SYSTEM QUALITY INDICES FROM THE WINTER, 1978 SAMPLING PERIOD

FIGURE 2.7-14



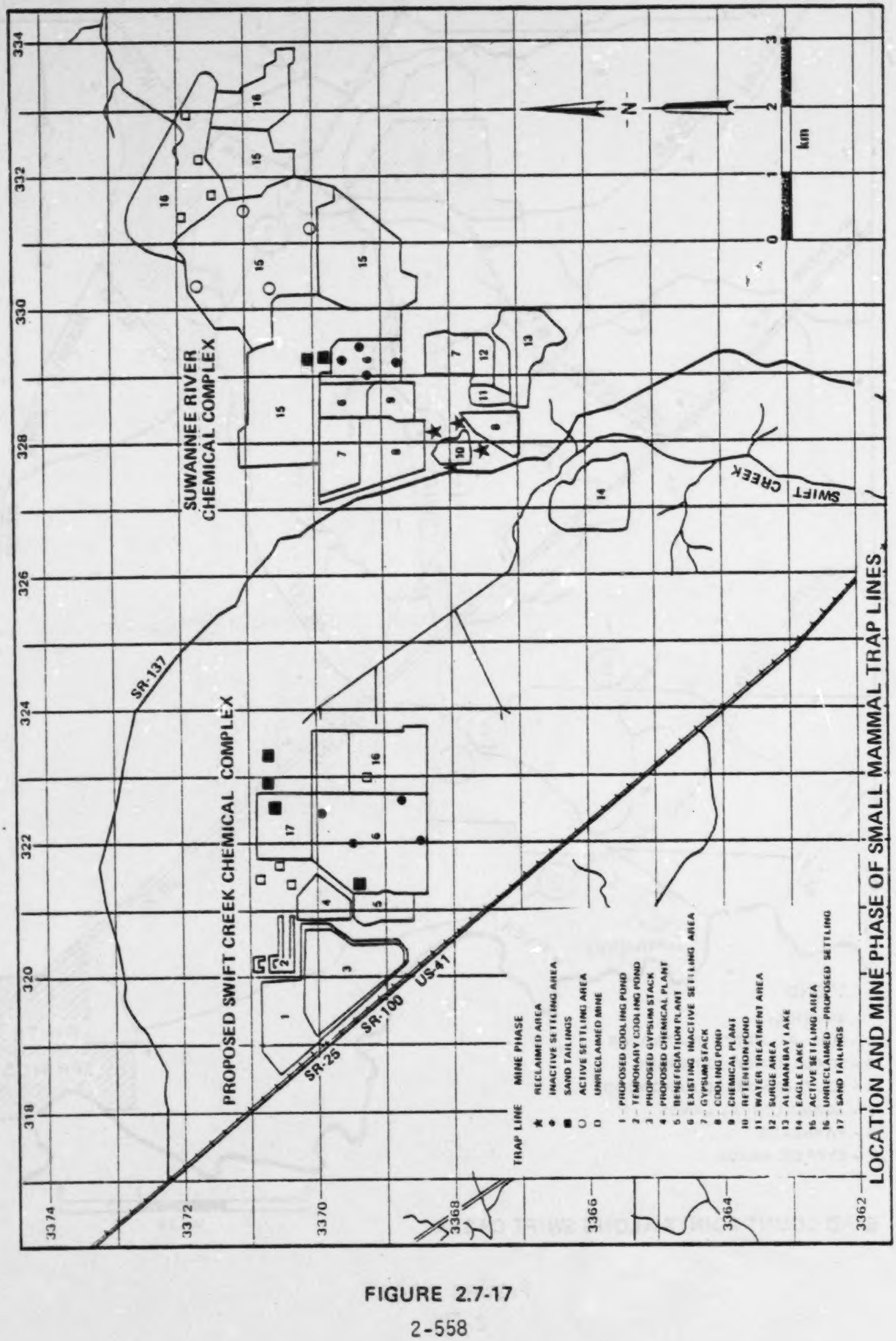
FISH DIVERSITY AND BIOMASS FOR SWIFT CREEK AND SEVERAL NEARBY CREEKS

FIGURE 2.7-15


MINED AREA
THE PASTURE ROAD
ALTMAN BAY ROAD
-N-
SOUTHERN R.R.
OCCIDENTAL R.R.
SWIFT CREEK
FACIL ROAD
ONEMILE STILL ROAD
RIVER ROAD
SR-137
SR-100
US-41
SR-25
I-75
SUWANNEE RIVER
WHITE SPRINGS
0 1 2 3
MILES
TRAP LINE
HABITAT TYPE
★ PINE–PALMETTO FLATWOODS
■ HIGH PINELANDS
○ MIXED HARDWOOD SYSTEMS
● SWAMP SYSTEMS

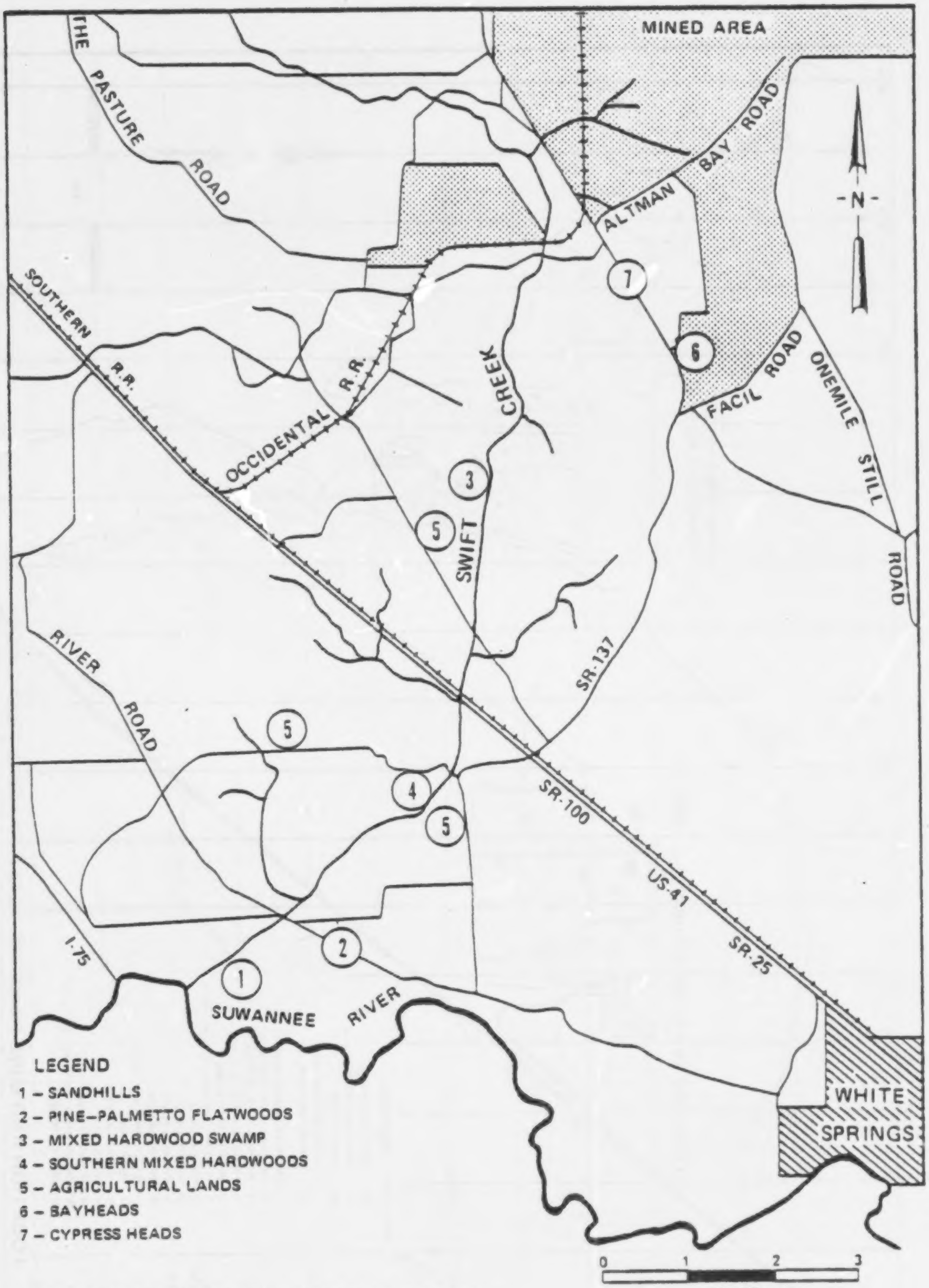
LOCATION AND HABITAT TYPES OF SMALL MAMMAL TRAP LINES

FIGURE 2.7-16


PROPOSED SWIFT CREEK CHEMICAL COMPLEX
SUWANNEE RIVER CHEMICAL COMPLEX
SR-137
SR-25
SR-100
US-41
SWIFT CREEK
N
km
0
1
2
3
318
320
322
324
326
328
330
332
334
3374
3372
3370
3368
3366
3364
3362
TRAP LINE
MINE PHASE
★ RECLAIMED AREA
● INACTIVE SETTLING AREA
■ SAND TAILINGS
○ ACTIVE SETTLING AREA
□ UNRECLAIMED MINE
1 - PROPOSED COOLING POND
2 - TEMPORARY COOLING POND
3 - PROPOSED GYPSUM STACK
4 - PROPOSED CHEMICAL PLANT
5 - BENEFICIATION PLANT
6 - EXISTING INACTIVE SETTLING AREA
7 - GYPSUM STACK
8 - COOLING POND
9 - CHEMICAL PLANT
10 - RETENTION POND
11 - WATER TREATMENT AREA
12 - SURGE AREA
13 - ALTMAN BAY LAKE
14 - EAGLE LAKE
15 - ACTIVE SETTLING AREA
16 - UNRECLAIMED - PROPOSED SETTLING
17 - SAND TAILINGS

LOCATION AND MINE PHASE OF SMALL MAMMAL TRAP LINES

FIGURE 2.7-17


MINED AREA
THE PASTURE ROAD
ALTMAN BAY ROAD
N
SOUTHERN R.R.
OCCIDENTAL R.R.
SWIFT CREEK
FACIL ROAD
ONEMILE STILL ROAD
RIVER ROAD
SR-137
SR-100
US-41
SR-25
I-75
SUWANNEE RIVER
WHITE SPRINGS
1
2
3
4
5
5
5
6
7
LEGEND
1 – SANDHILLS
2 – PINE–PALMETTO FLATWOODS
3 – MIXED HARDWOOD SWAMP
4 – SOUTHERN MIXED HARDWOODS
5 – AGRICULTURAL LANDS
6 – BAYHEADS
7 – CYPRESS HEADS
0
1
2
3
MILES

BIRD COUNT POINTS ALONG SWIFT CREEK

FIGURE 2.7-18

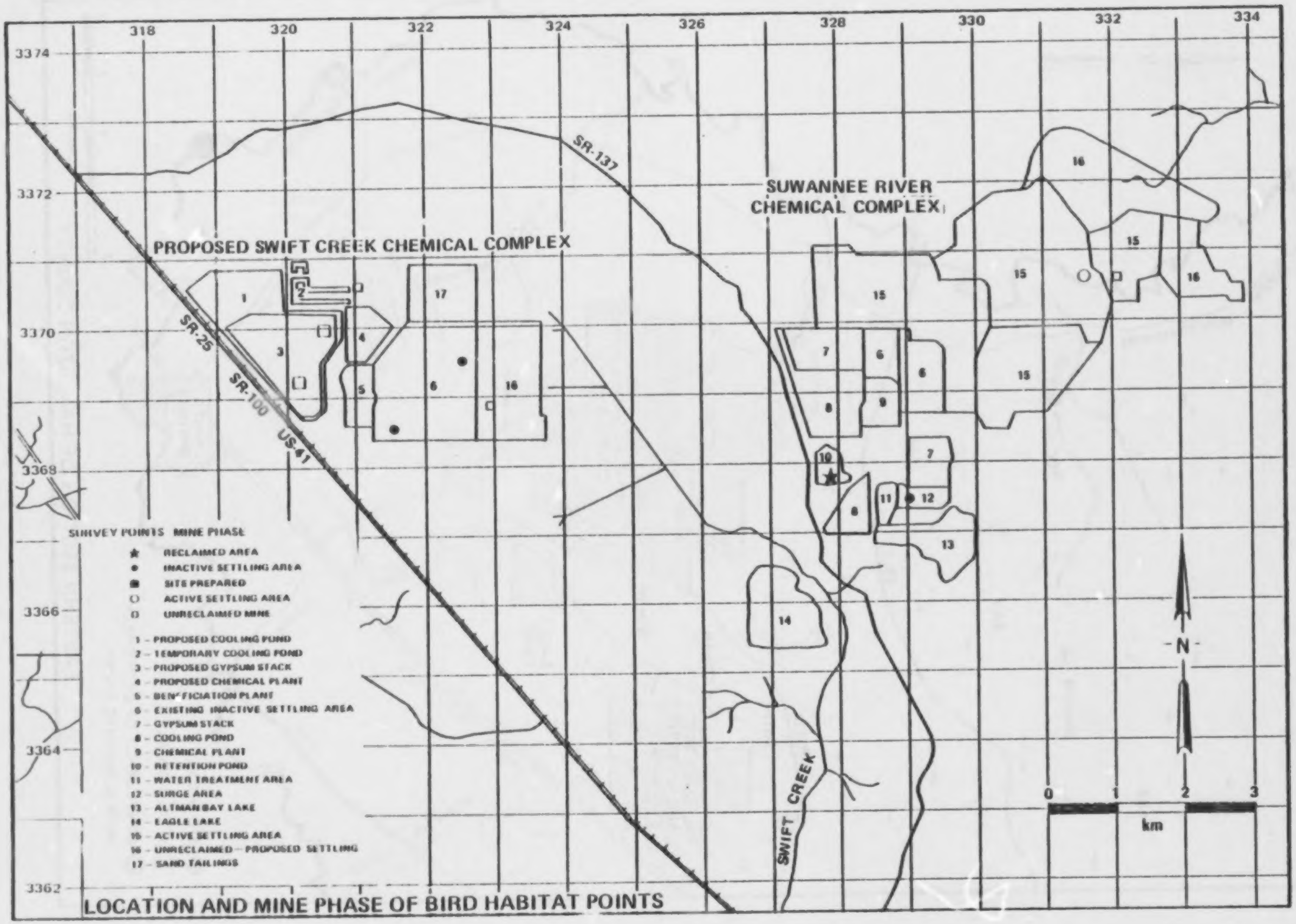

LOCATION AND MINE PHASE OF BIRD HABITAT POINTS
PROPOSED SWIFT CREEK CHEMICAL COMPLEX
SUWANNEE RIVER CHEMICAL COMPLEX
SR-137
SR-25
SR-100
US-41
SWIFT CREEK
N
0
1
2
3
km
318
320
322
324
326
328
330
332
334
3374
3372
3370
3368
3366
3364
3362
SURVEY POINTS MINE PHASE
★ RECLAIMED AREA
● INACTIVE SETTLING AREA
■ SITE PREPARED
○ ACTIVE SETTLING AREA
□ UNRECLAIMED MINE
1 – PROPOSED COOLING POND
2 – TEMPORARY COOLING POND
3 – PROPOSED GYPSUM STACK
4 – PROPOSED CHEMICAL PLANT
5 – BENEFICIATION PLANT
6 – EXISTING INACTIVE SETTLING AREA
7 – GYPSUM STACK
8 – COOLING POND
9 – CHEMICAL PLANT
10 – RETENTION POND
11 – WATER TREATMENT AREA
12 – SURGE AREA
13 – ALTMAN BAY LAKE
14 – EAGLE LAKE
15 – ACTIVE SETTLING AREA
16 – UNRECLAIMED – PROPOSED SETTLING
17 – SAND TAILINGS
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17

FIGURE 2.7-19

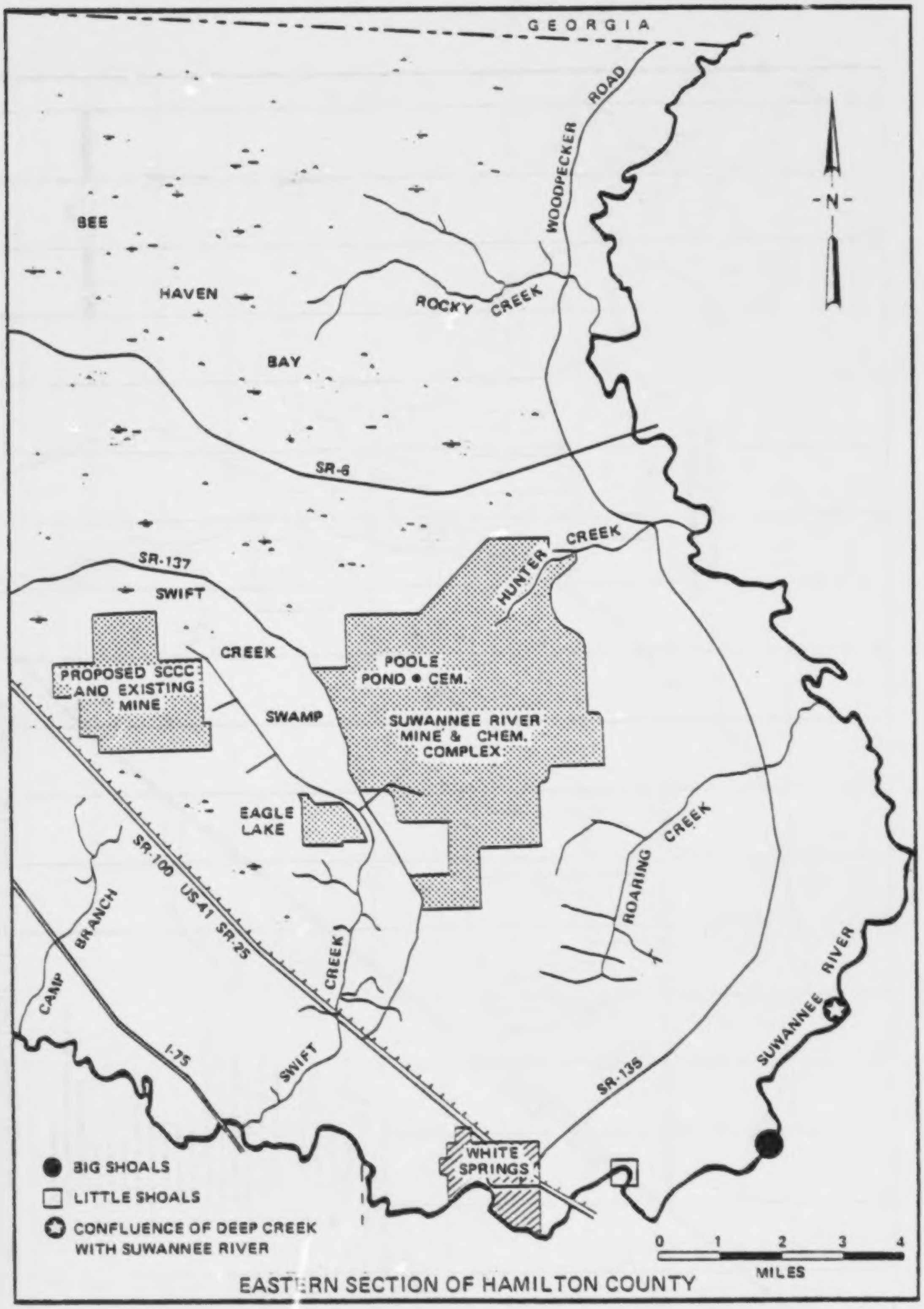

GEORGIA
WOODPECKER ROAD
N
BEE
HAVEN
BAY
ROCKY CREEK
SR-6
HUNTER CREEK
SR-137
SWIFT
CREEK
SWAMP
PROPOSED SCCC AND EXISTING MINE
POOLE POND
CEM.
SUWANNEE RIVER MINE & CHEM. COMPLEX
EAGLE LAKE
ROARING CREEK
SR-100 US-41 SR-25
CAMP BRANCH
CREEK
SWIFT
I-75
SR-135
SUWANNEE RIVER
WHITE SPRINGS
● BIG SHOALS
☐ LITTLE SHOALS
✪ CONFLUENCE OF DEEP CREEK WITH SUWANNEE RIVER
0
1
2
3
4
MILES
EASTERN SECTION OF HAMILTON COUNTY

FIGURE 2.7-20

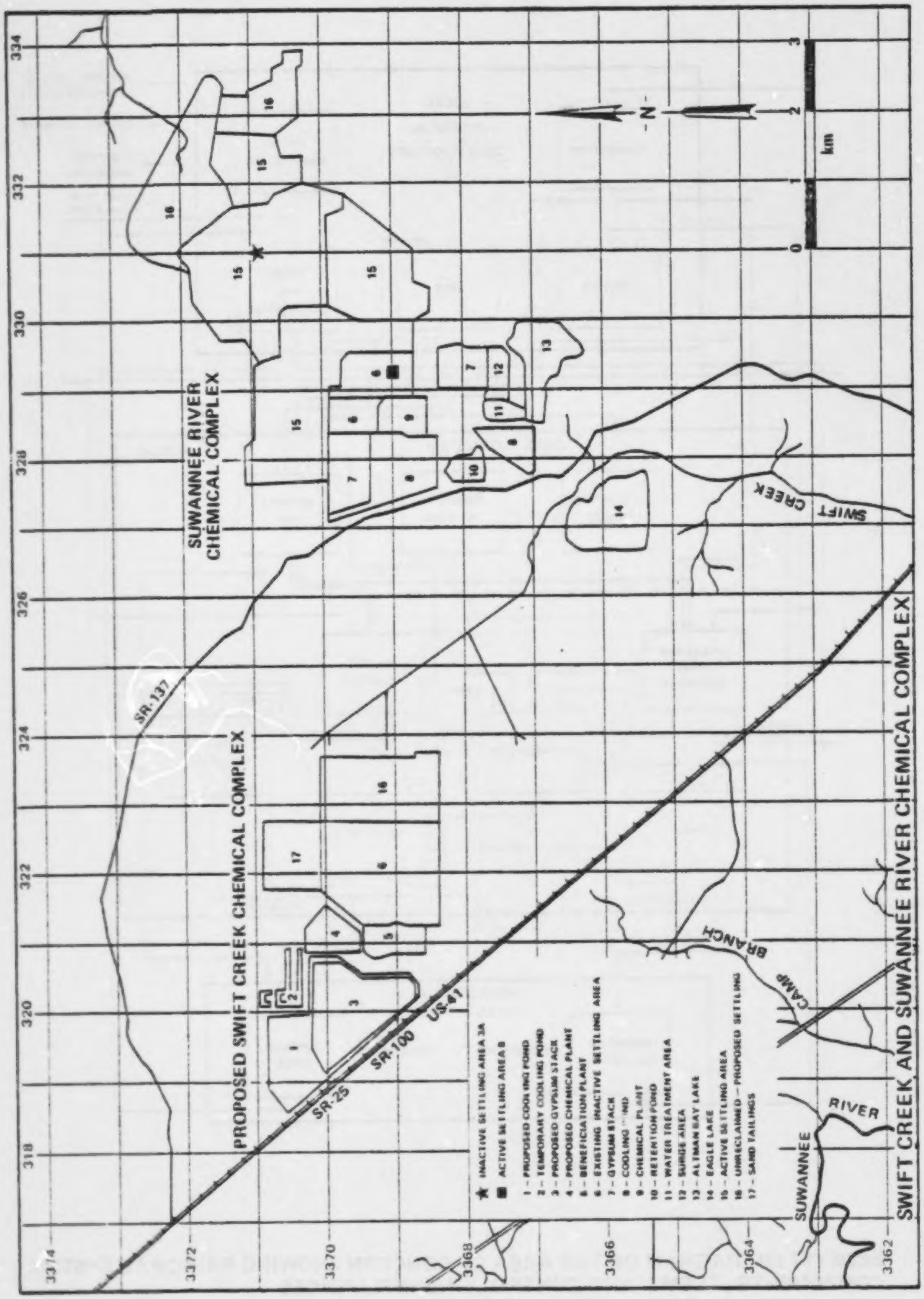
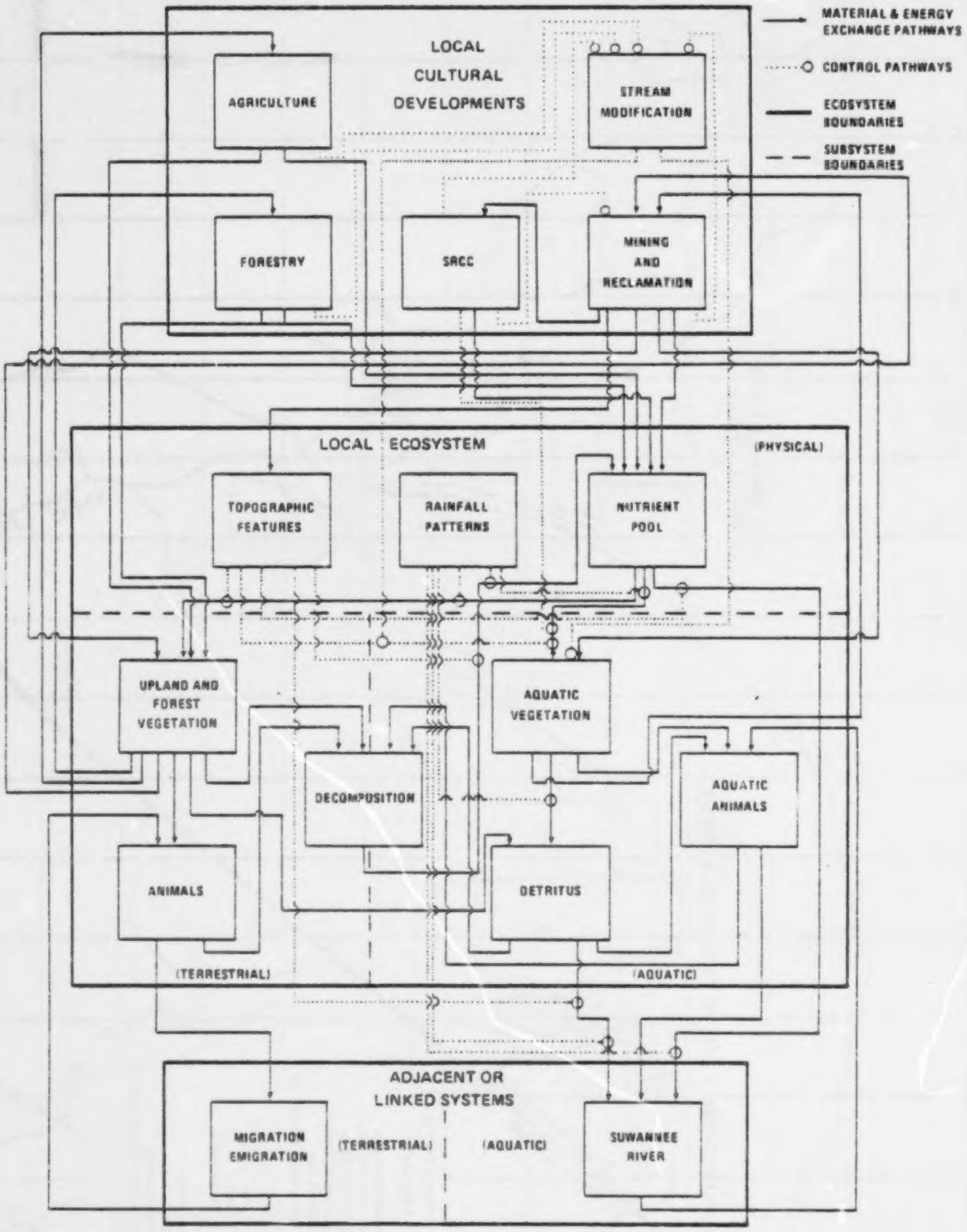

SWIFT CREEK AND SUWANNEE RIVER CHEMICAL COMPLEX
PROPOSED SWIFT CREEK CHEMICAL COMPLEX
SUWANNEE RIVER CHEMICAL COMPLEX
SR-137
SR-25
SR-100
US-41
SWIFT CREEK
CAMP BRANCH
SUWANNEE RIVER
N
0 1 2 3
km
318
320
322
324
326
328
330
332
334
3374
3372
3370
3368
3366
3364
3362
★ INACTIVE SETTLING AREA 3A
■ ACTIVE SETTLING AREA 8
1 – PROPOSED COOLING POND
2 – TEMPORARY COOLING POND
3 – PROPOSED GYPSUM STACK
4 – PROPOSED CHEMICAL PLANT
5 – BENEFICIATION PLANT
6 – EXISTING INACTIVE SETTLING AREA
7 – GYPSUM STACK
8 – COOLING POND
9 – CHEMICAL PLANT
10 – RETENTION POND
11 – WATER TREATMENT AREA
12 – SURGE AREA
13 – ALTMAN BAY LAKE
14 – EAGLE LAKE
15 – ACTIVE SETTLING AREA
16 – UNRECLAIMED – PROPOSED SETTLING
17 – SAND TAILINGS

FIGURE 2.7-21


MATERIAL & ENERGY EXCHANGE PATHWAYS
CONTROL PATHWAYS
ECOSYSTEM BOUNDARIES
SUBSYSTEM BOUNDARIES
LOCAL CULTURAL DEVELOPMENTS
AGRICULTURE
STREAM MODIFICATION
FORESTRY
SRCC
MINING AND RECLAMATION
LOCAL ECOSYSTEM
(PHYSICAL)
TOPOGRAPHIC FEATURES
RAINFALL PATTERNS
NUTRIENT POOL
UPLAND AND FOREST VEGETATION
AQUATIC VEGETATION
DECOMPOSITION
AQUATIC ANIMALS
ANIMALS
DETRITUS
(TERRESTRIAL)
(AQUATIC)
ADJACENT OR LINKED SYSTEMS
MIGRATION EMIGRATION
(TERRESTRIAL)
(AQUATIC)
SUWANNEE RIVER

ECOSYSTEM DIAGRAM OF THE AREA OF CONCERN SHOWING PRINCIPAL SYSTEM COMPONENTS, FLOWS AND CONTROLLING INFLUENCES

FIGURE 2.7-22

APPENDICES

SECTIONS 2.6 and 2.7

Appendix A Aquatic macrophytes of the Swift Creek Watershed.

	SPECIES	
Station Number*	Scientific Name	Common Name
SC-1A		
SC-2A		
SC-3A	*Juncus* sp.	Rushes
	Woodwardia virginica	Virginia chain-fern
SC-4A		
SC-4D	*Juncus* sp.	Rushes
	Murdannia keisak	
	Polygonum hydropiperoides	
SC-5A	*Polygonum hydropiperoides*	Mild water-pepper
	Saururus cernuus	Lizard's tail
SC-5D	*Beohmeria cylindrica*	False nettle
	Polygonum hydropiperoides	Mild water-pepper
	Rorippa islandica	Yellow cress
	Saururus cernuus	Lizard's tail
SC-6A	*Boehmeria drummondiana*	Bog nettle
SC-6D	*Ludwigia* sp.	
	Hydrocotyle umbellata	Marsh pennywort
	Polygonum hydropiperoides	Mild water-pepper
SC-7A	*Ludwigia* sp.	
	Lycopus sp.	
	Mikania scandens	Climbing hempweed
	Panicum scabriusculum	
	Saururus cernuus	Lizard's tail
	Woodwardia virginica	Virginia chain-fern
SC-7D	*Ludwigia* sp.	
	Lycopus sp.	
	Panicum scabriusculum	
	Saururus cernuus	Lizard's tail
SC-8A	*Cladium jamaicense*	Sawgrass
	Juncus sp.	Rushes
	Ludwigia sp.	
	Osmunda regalis	Royal fern

Appendix A (Continued)

	SPECIES	
Station Number*	Scientific Name	Common Name
SC-8D	*Juncus* sp.	Rushes
	Lemna sp.	Duckweed

* Sampling station location shown in Figure 2.7-8.

APPENDIX B

Benthic Macroinvertebrates

Station: SC-1 Location: Flood zones of Suwannee River. Upstream from confluence of Swift Creek with Suwannee River. Well-shaded area in Southern mixed hardwoods.

Date of Collection: November 16, 1977

Taxon	Cells/mm^2
Capartygramma crucicula	0.12
Chlorophyta	
Ankistrodesmus convolutus	7.20
Cosmarium sp.	0.06
Cncigenia tetrapedia	2.64
Scenedesmus dimorphus	0.72
Scenedesmus obliquus	3.60
Scenedesmus quadricauda	3.12
Scenedesmus sp.	2.88
Chrysophyta	
Cyclotella meneghiniana	0.60
Eunotia major	5.52
Navicula lanceolata	0.84
Nitzschia palea	0.18
Synedra ulna	6.30
Cyanophyta	
Oscillatoria sp.	1.44
Euglenophyta	
Euglena so.	0.12
Phacus sp.	0.54

Number of Taxa: 16
Diversity: 3.25
Equitibility: 0.88

Station: SC-2 Location: At bridge on River road. Shaded area in Southern mixed hardwoods.
Date of Collection: November 16, 1977

Taxon	Cells/mm^2
Chlorophyta	
Ankistrodesmus convolutus	20.64
Cosmarium sp.	0.08
Cncigenia tetrapedia	58.24
Cncigenia quadrata	0.32
Polydriopsis quadrispina	0.08
Quadrigula sp.	0.64
Scenedesmus dimorphus	3.20
Scenedesmus obliquus	32.80
Scenedesmus quadricauda	8.96
Scenedesmus sp.	10.88
Chrysophyta	
Achnanthes lanceolata	0.16
Cyclotella meneghiniana	0.24
Cymbella turgida	0.08
Eunotia major	9.68
Navicula elginensis	0.08
Navicula lanceolata	5.60
Neidium sp.	0.08
Nitzschia palea	0.24
Synedra ulna	2.56
Cyanophyta	
Oscillatoria sp.	6.00
Microcystis sp.	11.20
Euglenophyta	
Euglena sp.	0.16
Phacus orbicularis	0.48

Number of Taxa: 23
Diversity: 2.98
Equitibility: 0.48

Station: SC-4A Location: At U.S. 41 bridge. Sunlit area in Southern mixed hardwoods.
Date of Collection: November 16, 1977

Taxon	Cells/mm²
Chlorophyta	
Ankistrodesmus convolutus	4.56
Cncigenia tetrapedia	2.56
Elakatothrix sp.	0.32
Kirchneriella sp.	0.32
Polydriopsis quadrispina	0.08
Scenedesmus abundans	1.12
Scenedesmus dimorphus	1.60
Scenedesmus obliquus	9.92
Scenedesmus quadricauda	4.80
Staurastrum sp.	0.08
Chrysophyta	
Cyclotella meneghiniana	2.40
Eunotia major	1.76
Gomphonema sp.	0.08
Navicula lanceolata	1.36
Nitzschia palea	0.08
Pinnularia sp.	0.08
Synedra ulna	3.12
Cyanophyta	
Microcystis sp.	1.60
Oscillatoria sp.	0.80
Euglenophyta	
Phacus sp.	0.16

Number of Taxa: 20
Diversity: 3.39
Equitibility: 0.75

Station: SC-4B Location: At U.S. 41 bridge. Shaded area in Southern mixed hardwoods.
Date of Collection: November 16, 1977

Taxon	Cells/mm^2
Chlorophyta	
Ankistrodesmus convolutus	15.20
Cncigenia quadrata	0.40
Cncigenia tetrapedia	4.80
Scenedesmus abundans	1.60
Scenedesmus dimorphus	2.40
Scenedesmus obliquus	23.60
Scenedesmus quadricauda	7.20
Scenedesmus sp.	10.00
Tetraedron trigonum	0.10
Chrysophyta	
Eunotia major	4.80
Gomphonema sp.	0.20
Navicula lanceolata	2.40
Pinnularia subcapitata	0.30
Synedra ulna	6.80
Cyanophyta	
Oscillatoria sp.	5.30
Microcystis sp.	1.60
Euglenophyta	
Phacus sp.	1.00

Number of Taxa: 17
Diversity: 3.25
Equitibility: 0.82

Station: SC-6 Location: Approximately 1.0 mile upstream from SC-4. Shaded area in mixed hardwood swamp with hyacinth mat.
Date of Collection: November 16, 1977

Taxon	Cells/mm^2
Chlorophyta	
Ankistrodesmus convolutus	1.97
Cosmarium sp.	0.32
Cncigenia tetrapedia	9.76
Scenedesmus abundans	1.84
Scenedesmus denticulatus	0.32
Scenedesmus dimorphus	0.80
Scenedesmus obliquus	15.28
Scenedesmus quadricauda	5.28
Scenedesmus sp.	6.24
Tetraedron trigonum	0.16
Chrysophyta	
Eunotia major	1.68
Cyclotella meneghiniana	0.64
Cyclotella stelligera	0.48
Gomphonema sp.	1.92
Gyrosigma sp.	0.08
Navicula elginensis	0.24
Navicula lanceolata	4.08
Pinnularia subcapitata	0.16
Synedra ulna	1.52
Cyanophyta	
Oscillatoria sp.	45.05
Euglenophyta	
Phacus sp.	0.16

Number of Taxa:	21
Diversity:	2.80
Equitibility:	0.48

Station: SC-7

Location: At railroad trestle on Occidental property. Channelized portion with hyacinths. Sunlit area.

Date of Collection: November 16, 1977

Taxon	Cells/mm^2
Chlorophyta	
Ankistrodlesmus convolutus	4.00
Cosmarium sp.	1.76
Cncigenia tetrapedia	0.83
Scenedesmus obliquus	20.48
Scenedesmus quadricauda	5.76
Chrysophyta	
Cyclotella meneghiniana	1.12
Cymbella sp.	0.16
Eunotia major	1.60
Gomphonema sp.	1.60
Navicula lanceolata	64.96
Nitzschia palea	56.00
Synedra ulna	1.12
Cyanophyta	
Oscillatoria sp.	37.44
Microcystis sp.	16.64
Euglenophyta	
Euglena sp.	0.32
Phacus sp.	1.12

Number of Taxa: 16

Diversity: 2.66

Equitibility: 0.55

Station: ABC-8 Location: Culvert at SR 137. Channelized
portion. Sunlit area.
Date of Collection: November 16, 1977

Taxon	Cells/mm^2
Chlorophyta	
Ankistrodesmus convolutus	3.46
Cosmarium sp.	0.76
Cncigenia tetrapedia	13.82
Rhizoclonium sp.	0.22
Scenedesmus dimorphus	0.65
Scenedesmus obliquus	6.26
Scenedesmus quadricauda	8.21
Chrysophyta	
Achnanthes lanceolata v. *dubia*	0.11
Cyclotella meneghiniana	0.65
Cyclotella stelligera	0.65
Eunotia major	0.22
Gomphonema sp.	1.94
Navicula lanceolata	3.13
Nitzschia palea	0.54
Pinnularia subcapitata	0.11
Synedra ulna	0.22
Cyanophyta	
Oscillatoria sp.	31.75
Euglenophyta	
Phacus sp.	0.22

Number of Taxa: 18
Diversity: 2.61
Equitibility: 0.49

Station: SC-9 Location: At bridge on Occidental property.
Channelized, shaded by brush
Date of Collection: November 16, 1977

Taxon	Cells/mm^2
Chrysophyta	
Cyclotella meneghiniana	5.04
Eunotia major	4.56
Gyrosigma sp.	0.32
Navicula notha	5.60
Nitzschia palea	0.56
Synedra ulna	0.16
Cyanophyta	
Oscillatoria limosa	25.12
Euglenophyta	
Euglena sp.	0.16
Phacus sp.	1.12

Number of Taxa:	9
Diversity:	1.88
Equitibility:	0.53

Station: CB-1 Location: Approximately 2.3 miles downstream
from CB-3 at sink. Shaded area in
Southern mixed hardwoods.
Date of Collection: November 16, 1977

Taxon	Cells/mm²
Chlorophyta	
Ankistrodesmus convolutus	0.05
Cncigenia tetapedia	0.20
Cosmarium sp.	0.15
Chrysophyta	
Achnanthes clevei	0.05
Amphora ovalis	0.10
Cyclotella meneghiniana	2.90
Diploneis sp.	0.10
Eunotia major	0.65
Gomphonema sp.	0.84
Melosira varians	1.75
Nitzschia lanceolata	1.45
Nitzschia notha	4.20
Nitzschia palea	3.50
Nitzschia sp.	2.10
Surinella sp.	0.05
Synedra ulna	0.30
Terpsinoe americana	0.90
Cyanophyta	
Oscillatoria sp.	24.35

Number of Taxa:	18
Diversity:	2.35
Equitibility:	0.39

Station: CB-2 Location: Approximately 1.7 miles downstream
from CB-3 at bridge on county road.
Shaded area in Southern mixed
hardwoods.
Date of Collection: November 16, 1977

Taxon	Cells/mm^2
Chlorophyta	
Ankistrodesmus convolutus	0.04
Closterium sp.	0.04
Rhizoclonium sp.	0.80
Scenedesmus denticularis	0.48
Scenedesmus quadricauda	0.16
Chrysophyta	
Amphora ovalis	0.80
Cyclotella meneghiniana	0.80
Eunotia major	1.21
Gryosigma sp.	0.04
Melosira granulata	5.47
Melosira varians	0.80
Navicula lanceolata	10.75
Nitzschia palea	1.25
Surinella sp.	0.12
Synedra ulna	1.17
Cyanophyta	
Oscillatoria sp.	25.77

Number of Taxa:	16
Diversity:	1.94
Equitibility:	0.31

Station: CB-3 Location: At SR 132 bridge. Shaded area in Southern mixed hardwoods.
Date of Collection: November 16, 1977

Taxon	Cells/mm²
Chlorophyta	
Ankistrodesmus convolutus	0.04
Chrysophyta	
Cymbella sp.	0.02
Eunotia major	0.06
Gyrosigma sp.	0.14
Navicula elginensis	0.04
Navicula lanceolata	0.06
Navicula sp.	0.02
Nitzschia palea	0.14
Pinnularia subcapitata	0.02
Cyanophyta	
Oscillatoria sp.	16.10
Euglenophyta	
Phacus sp.	0.04

Number of Taxa: 11
Diversity: 0.32
Equitibility: 0.13

Station: HC-1

Location: At bridge on SR 135. Shaded area in Southern mixed hardwoods.

Date of Collection: November 16, 1977

Taxon	Cells/mm²
Chlorophyta	
Ankistrodesmus convolutus	0.08
Cosmarium sp.	0.08
Chrysophyta	
Eunotia major	0.56
Navicula notha	26.56
Navicula sp.	0.16
Nitzschia palea	0.32
Pinnularia subcapitata	0.08
Cyanophyta	
Oscillatoria sp.	14.00
Euglenophyta	
Euglena sp.	0.08

Number of Taxa:	9
Diversity:	1.18
Equitibility:	0.31

Station: RO-2 Location: 1.8 miles upstream from confluence
with Suwannee River at SR 135 bridge.
Shaded area in Southern mixed
hardwoods.
Date of Collection: November 16, 1977

Taxon	Cells/mm^2
Chlorophyta	
Ankistrodesmus convolutus	0.16
Cncigenia tetrapedia	0.32
Cncigenia quadrata	0.64
Scenedesmus quadricauda	0.32
Chrysophyta	
Achnanthes lanceolata v. *dubia*	0.08
Cyclotella meneghiniana	1.60
Diploneis sp.	0.40
Eunotia major	7.36
Gomphonema sp.	0.08
Melosira granulata	19.20
Navicula lanceolata	1.76
Pinnularia subcapitata	0.08
Cyanophyta	
Oscillatoria sp.	0.80

Number of Taxa:	13
Diversity:	1.93
Equitibility:	0.38

Station: RC-2 Location: 1.5 miles upstream from confluence with Suwannee River. Upstream from USGS gauging station. Shaded area in Southern mixed hardwoods.

Date of Collection: November 16, 1977

Taxon	Cells/mm^2
Chlorophyta	
Mougeotia sp.	0.15
Staurastrum breviacubatum	0.02
Chrysophyta	
Achnanthes lanceolata v. *dubia*	0.02
Cyclotella stelligera	0.12
Cymbella sp.	0.05
Eunotia diodon	0.02
Frustulia rhomboides	0.02
Melosira granulata	0.45
Navicula sp.	0.75
Surirella sp.	0.05
Synedra ulna	0.20
Tabellaria sp.	0.10

Number of Taxa: 12
Diversity: 2.95
Equitibility: 0.92

Station: SR-7 Location: Upstream on Suwannee River from confluence with Swift Creek.
Date of Collection: November 16, 1977

Taxon	Cells/mm^2
Capartogramma crucicula	0.04
Chlorophyta	
Ankistrodesmus convolutus	0.04
Closterium moniliferum	0.08
Mougeotia sp.	0.88
Rhizoclonium sp.	0.28
Scenedesmus quadricauda	0.16
Chrysophyta	
Cyclotella meneghiniana	1.08
Cyclotella stelligera	1.08
Eunotia major	0.52
Frustulia sp.	0.16
Gyrosigma sp.	0.04
Melosira varians	0.08
Navicula elginensis	0.28
Navicula lanceolata	0.20
Navicula notha	0.20
Nitzschia palea	0.48
Pinnularia sp.	0.04
Cyanophyta	
Oscillatoria sp.	7.20

Number of Taxa: 18
Diversity: 2.48
Equitibility: 0.42

Station: SR-8 Location: Downstream on Suwannee River from confluence with Swift Creek.
Date of Collection: November 16, 1977

Taxon	Cells/mm^2
Chlorophyta	
Ankistrodesmus convolutus	0.04
Cncigenia tetrapedia	0.08
Cncigenia quadrata	0.08
Mougeotia sp.	0.20
Scenedesmus abundans	0.16
Scenedesmus quadricauda	0.12
Scenedesmus sp.	0.12
Chrysophyta	
Cyclotella stelligera	0.04
Eunotia major	1.29
Frustulia sp.	0.02
Melosira varians	0.04
Navicula elginensis	0.06
Navicula lanceolata	0.18
Navicula notha	0.18
Nitzschia palea	0.02
Pinnularia subcapitata	0.04
Pinnularia sp.	0.02
Synedra ulna	0.02
Euglenophyta	
Phacus sp.	0.04

Number of Taxa: 19
Diversity: 3.01
Equitibility: 0.58

APPENDIX C-1

Taxa, Beck's Biotic Index, and Pollution Tolerance Classification of Benthic Organisms Collected in Fall 1977 Sampling from Natural Substrates in the Study Area

Station: SC-1
Replicate: 1

Location: 100 m upstream from confluence with Suwannee River. Well-shaded area in Southern mixed hardwoods.

Date of Collection: November 4, 1977

Taxon	Number Collected	%	Beck's Biotic Index	Pollution Tolerance Classification
Oligochaeta	13	65.0	III	T,F
Odonata				
Gomphus sp.	1	5.0	II	F
Diptera				
Cryptochironomus ponderosus	3	15.0	III	T
Dicrotendipes sp.	1	5.0	II	F,I
Polypedilum halterale	2	10.0	I	F,I

Total Collected: 20
Number of Taxa: 5

Diversity: 1.58
Equitibility: 0.76

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	1	2	2	--	--
Percent	20.0	40.0	40.0	--	--

Beck's Biotic Index = 4

Station: SC-1
Replicate: 2

Location: Flood zone of Suwanne River upstream from confluence of Swift Creek with Suwannee River. Well-shaded area on Southern mixed hardwoods.
Date of Collection: November, 1977

Taxon	Number Collected	%	Index	Pollution Tolerance Classification
Oligochaeta	9	69.2	III	T,F
Diptera				
Polypedilum halterale	2	15.4	I	F,I
Polypedilum tritum	1	7.7	II	F
Cryptochironomus ponderosus	1	7.7	III	T

Total Collected: 13
Number of Taxa: 4

Diversity: 1.58
Equitibility: 0.76

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	1	1	2	--	--
Percent	25.0	25.0	50.0	--	--

Beck's Biotic Index = 3

Station: SC-1
Replicata: 3

Location: Flood zone of Suwannee River upstream from confluence of Swift Creek with Suwannee River. Well-shaded area in Southern mixed hardwoods.

Date of Collection: November 4, 1977

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Oligochaeta	19	10.3	III	T,F
Hirudinea	67	36.2	V	T,F
Trichoptera				
Cheumatopsyche sp.	1	0.5	II	F
Coleoptera				
Stenelmis sp.	1	0.5	II	F,I
Diptera				
Bezzia sp.	4	2.2	III	T
Cricotopus sp.	48	25.9	I	I
Polypedilum halterale	15	8.7	I	F,I
Polypedilum tritum	19	10.3	II	F
Tanytarsus sp.	3	1.6	II	F,I
Conchapelopia sp.	3	1.6	V	F
Phaenopsectra sp.	5	2.7	V	I

Total Collected: 185
Number of Taxa: 11

Diversity: 2.54
Equitibility: 0.73

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	2	4	2	--	3
Percent	18.1	36.4	18.1	--	27.3

Beck's Biotic Index = 8

Station: SC-2
Replicate: 1

Location: At bridge on River Road. Shaded area in Southern mixed hardwoods.
Date of Collection: November 4, 1977

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Oligocheata	93	95.0	III	T,F
Diptera				
Cladotanytarsus sp.	1	1.0	II	F
Polypedilum halterale	1	1.0	I	F,I
Cryptocheronomus ponderosus	2	2.0	III	T
Polypedilum tritum	1	1.0	II	F

Total Collected: 98
Number of Taxa: 5

Diversity: 0.39
Equitibility: 0.30

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	1	2	2	--	--
Percent	20.0	40.0	40.0	--	--

Beck's Biotic Index = 4

Station: SC-2 Location: At bridge on River Road.
Replicate: 2 Shaded area in Southern mixed hardwoods.
Date of Collection: November 4, 1977

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Oligochaeta	133	91.1	III	T,F
Odonata				
Gomphus sp.	1	0.7	II	F
Trichoptera				
Oecetis sp.	2	1.4	II	F
Diptera				
Bezzia sp.	2	1.4	III	T
Cryptochironomus ponderosus	3	2.0	III	T
Polypedilum halterale	1	0.7	I	F,I
Polypedilum tritum	1	0.7	II	F
Micropsecta sp.	2	1.4	V	F,I
Mollusca				
Physa sp.	1	0.7	III	T

Total Collected: 146
Number of Taxa: 9
Diversity: 0.69
Equitibility: 0.21

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	1	3	4	--	1
Percent	11.1	33.3	44.4	--	11.1

Beck's Biotic Index = 5

Station: SC-2
Replicate: 3

Location: At bridge on River Road.
Shaded area in Southern mixed
hardwoods.
Date of Collection: November 4, 1977

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Oligochaeta	17	89.4	III	T,F
Diptera				
Polypedilum halterale	1	5.3	I	F,I
Mollusca				
Physa sp.	1	5.3	III	T

Total Collected:	19	Diversity:	0.59
Number of Taxa:	3	Equitibility:	0.58

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	1	--	2	--	--
Percent	33.3	--	66.7	--	--

Beck's Biotic Index = 2

Station: SC-3
Replicate: 1
Location: Small tributary downstream from SC-4. 20 meters upstream from confluence with Swift Creek. In agricultural area.
Date of Collection: November 8, 1977

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Isopoda				
Asellus sp.	1	0.6	I	T,FI
Ephemeroptera				
Habrophlebiodes sp.	1	0.6	V	
Baetis sp.	20	11.5	V	
Trichoptera				
Chimarra periqua	3	1.7	I	I
Cheumatopsyche sp.	29	16.7	II	F
Diptera				
Simulium sp.	7		I	I
Stenochironomus helaris	2	1.1	I	I
Cryptochironomus fulvus	2	1.1	III	F
Bezzia sp.	1	0.6	III	T
Conchopelopia sp.	3	1.7	V	F
Rheotanytarsus sp.	12	6.9	II	F
Tanytarsus sp.	3	1.7	II	F,I
Polypedilum halterale	54	31.0	I	F,I
Polypedilum tritum	36	20.7	II	F

Total Collected: 174
Number of Taxon: 14

Diversity: 2.82
Equibility: 0.71

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	5	4	2	--	3
Percent	35.7	28.6	14.3	--	21.4

Beck's Biotic Index = 14

Station: SC-3
Replicate: 2

Location: Small tributary downstream from SC-4 20 meters upstream from confluence with Swift Creek. In agricultural area.

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Amphipoda				
Hyalela azteca	6	9.1	II	F
Trichoptera				
Cheumatopsyche sp.	1	1.5	II	F
Diptera				
Bezzia sp.	1	1.5	III	T
Cryptochironomus fulvus	2	3.0	III	T,I
Polypedilum illinaense	33	5.0	II	F,I
Micropsectra sp.	7	10.6	V	F,I
Tribelos sp.	7	10.6	I	I
Polypedilum halterale	6	9.1	I	F,I
Tanytarsus sp.	2	3.0	II	F,I
Mollusca				
Sphaerium sp.	1	1.5	III	

Total Collected: 66
Number of Taxa: 10

Diversity: 2.40
Equitibility: 0.72

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	2	4	3	--	1
Percent	20.0	40.0	30.0	--	10.0

Beck's Biotic Index = 8

Station: SC-3 Location: Small tributary downstream from SC-4
Replicate: 3 20 meters upstream fro confluence with
Swift Creek. In agricultural area.

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Oligochaeta	1	3.3	III	T,F
Isopoda				
Asellus sp.	1	3.3	I	T,FI
Amphipoda				
Hyellela azteca	1	3.3	II	F
Ephemeroptera				
Caenis diminuta	1	3.3	III	F,I
Odonota				
Progomphus obscurus	1	3.3	I	I
Trichoptera				
Leptocella sp.	2	6.7	II	
Cheumatupsyche sp.	1	3.3	II	F
Radema sp.	1	3.3	V	
Coleoptera				
Microcyllocpus sp.	1	3.3	II	
Helodidae sp.	1	3.3	V	
Diptera				
Tabanus sp.	1	3.3	IV	I
Cryptochironomus fulvus	1	3.3	III	T,I
Bezzia sp.	1	3.3	III	T
Tanytarsus sp.	3	10.0	II	F,I
Polypedilum tritum	3	10.0	II	F
Micropsectra sp.	2	6.7	V	F,I
Chironomus attenuatus	5	16.7	III	T,I
Rheotanytarsus sp.	1	3.3	II	F
Mollusca				
Sphaerium sp.	2	6.7	III	

Total Collected: 30
Number of Taxa: 19

Diversity: 4.0
Equitibility: 1.2

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	2	7	6	1	3
Percent	10.5	36.8	31.6	5.3	15.8

Beck's Biotic Index = 11

Station: SC-4A
Replicate: 1

Location: At US-41 bridge. Sunlit area in Southern mixed hardwoods.
Date of Collection: November 8, 1977

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Ephemeroptera				
Caenis diminuta	1	0.3	III	T
Trichoptera				
Hydropsyche frisoni	2	0.7	I	I
Cheumatopsyche sp.	48	16.7	II	F
Coleoptera				
Stenelmis sp.	6	2.1	II	F,I
Dubiraphia sp.	17	5.9	II	F
Diptera				
Cryptochironomus fulvus	2	0.7	III	T,I
Cricotopus sp.	63	21.9	I	I
Polypedilum illinoense	72	25.0	II	F,I
Cardiocladius sp.	9	3.1	V	
Polypedilum halterale	18	6.2	I	F,I
Polypedilum tritum	9	3.1	II	F
Conchopelopia sp.	16	5.6	V	F
Nilothauma bicornis	1	0.3	V	
Tanytarsus sp.	24	8.3	II	F,I

Total Collected: 288
Number of Taxa: 14

Diversity: 3.02
Equitibility: 0.81

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	3	6	2	-	3
Percent	21.4	42.9	14.3	-	21.4

Beck's Biotic Index = 12

Station: SC-4A
Replicate: 2

Location: At US-41 bridge. Sunlit area in Southern mixed hardwoods.
Date of Collection: November 8, 1977

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Oligochaeta	69	15.9	III	T,F
Ephemeroptera				
Caenis diminuta	1	0.2	III	T
Odonata				
Macromia sp.	1	0.2	I	F,I
Agria sp.	1	0.2	I	I
Hirudinea				
Helobdella stagnalis	11	2.5	V	T
Trichoptera				
Cheumatopsyche sp.	73	16.8	II	F
Hydropsyche simulans	1	0.2	I	I
Megaloptera				
Corydalus cornutus	3	0.7	I	F,I
Coleoptera				
Dubiraphia sp.	4	0.9	II	F
Diptera				
Simulium sp.	2	0.4	I	I
Polypedilum illinoense	77	17.7	II	F,I
Cricotopus sp.	116	26.7	I	I
Micropsectra sp.	29	6.7	V	F,I
Conchopelopia sp.	19	4.4	V	F
Tanytarsus sp.	9	2.1	II	F,I
Polypedilum halterale	19	4.4	I	F,I

Total Collected: 435
Number of Taxa: 16

Diversity: 2.94
Equitibility: 0.68

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	7	4	2	-	3
Percent	43.8	25.0	12.5	-	18.8

Beck's Biotic Index = 18

Station: SC-4A　Location: At US-41 bridge. Sunlit area in
Replicate: 3　Southern mixed hardwoods.
Date of Collection: November 8, 1977

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Oligochaeta	56	6.6	III	T,F
Hirudinea				
Helobdella stagnalis	12	1.4	III	T
Ephemeroptera				
Caenis diminuta	2	0.2	III	T
Odonata				
Macromia sp.	2	0.2	I	F,I
Trichoptera				
Hydropsyche frisoni	1	0.1	I	I
Cheumatopsyche sp.	29	3.4	II	F
Coleoptera				
Stenelmis sp.	2	0.2	II	F,I
Dubiraphia sp.	29	3.4	II	F
Diptera				
Bezzia sp.	1	0.1	III	T
Labrundinia sp.	28	3.3	I	I
Polypedilum illinoense	278	33,1	II	F,I
Cricotopus sp.	223	26.5	I	I
Polypedilum halterale	111	13.2	I	F,I
Chironomus attenuatus	27	3.2	III	T,I
Micropsectra sp.	40	4.8	V	F,I

Total Collected: 841　Diversity: 2.72
Number of Taxa: 15　Equitibility: 0.61

	Becks Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	5	4	5	-	1
Percent	33.3	26.7	33.3	-	6.7

Beck's Biotic Index = 14

Station: SC-4B Location: At US 41 bridge. Shaded area.
Replicate: 1
Date of Collection: November 8, 1977

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Oligochaeta	1.2	1.2	III	T,F
Isopoda				
Asellus sp.	1.2	1.2	I	T,F,I
Amphipoda				
Hyallel azteca	1	0.1	II	F
Ephemeroptera				
Caenis diminuta	4	0.4	III	F,I
Odonata				
Agria sp.	9	0.9	I	I
Trichoptera				
Cheumatopsyche sp.	133	13.0	II	F
Coleoptera				
Dubiraphia sp.	48	4.7	II	F
Stenelmis sp.	3	0.3	II	F,I
Diptera				
Bezzia sp.	10	1.0	III	T
Simulium sp.	3	0.3	I	I
Conchopelopia sp.	18	1.8	V	F
Polypedilum tritum	267	26.2	II	F
Polypedilum halterale	72	7.1	I	F,I
Cricotopus sp.	240	23.5	I	I
Cardiocladius sp.	48	4.7	V	
Polypedilum illinuense	96	9.4	II	F,I
Phaenopsectra sp.	6	0.6	V	I
Labrundinia floridana	6	0.6	I	I
Rheotanytarsus sp.	7	o.7	II	F
Tanytarsus sp.	7	0.7	II	F,I

Total Collected: 1020
Number of Taxa: 20
Diversity: 3.13
Equitability: 0.62

	Beck's Biotic Class				
Classification:	I	II	III	IV	V
Number of Taxa	6	8	3	--	3
Percent	30.0	40.0	15.0	--	15.0

Beck's Biotic Index = 20

Station: SC-4B
Replicate: 2

Location: At U.S. 41 bridge.
Shaded area.
Date of Collection: November 8, 1977

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Oligochaeta	13	5.4	III	T,F
Hirundinea				
Helobdella stagnalis	1	0.4	III	T
Ephemeroptera				
Caenis diminata	1	0.4	III	T
Odonata				
Macromia sp.	1	0.4	I	F,I
Gomphus sp.	1	0.4	II	F
Hyponeura sp.	1	0.4	V	
Trichoptera				
Cheumatopsyche sp.	2	0.8	II	F
Oecetis sp.	1	0.4	II	F
Coleoptera				
Dubiraphia sp.	2	0.8	II	F
Diptera				
Bezzia sp.	3	1.2	III	T
Cryptochironomus fulvus	2	0.8	III	F
Polypedilum tritum	29	12.0	II	F
Micropsectra sp.	4	1.7	V	F,I
Polypedilum halterale	43	17.8	I	F,I
Rheotanytarsus sp.	1	0.4	II	F
Phaenopsectra sp.	14	5.8	V	I
Tribelos sp.	1	0.4	I	I
Cricotopus sp.	102	42.1	I	I
Labrundinia floridana	5	2.1	I	I
Chironomus carus	15	6.2	III	T

Total Collected: 242
Number of Taxa: 20

Diversity: 2.70
Equitability: 0.45

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	5	6	6	--	3
Percent	25.0	30.0	30.0	--	15.0

Beck's Biotic Index = 16

Station: SC-4B
Replicate: 3

Location: At U.S. 41 bridge. Shaded area.

Date of Collection: November 8, 1977

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Oligochaeta	26	19.7	III	T,F
Ephemcroptera				
Caenis diminuta	2	1.5	III	T
Odonata				
Gomphus sp.	2	1.5	II	F
Pachydiplax longipennis	1	0.8	II	
Macromia sp.	2	1.5	I	F,I
Trichoptera				
Chenmatopsyche sp.	4	3.0	II	F
Coleoptera				
Ancyronyx variegatus	1	0.8	V	I
Diptera				
Bezzia sp.	2	1.5	III	T
Procladius sp.	1	0.8	II	T,F
Chironomus attenuatus	18	13.6	III	T,I
Polypedilum tritum	20	15.2	II	F
Polypedilum halterale	36	27.3	I	F,I
Cricotopus sp.	8	6.1	I	I
Cryptochironomus fulvus	9	6.8	III	F

Total Collected: 132
Number of Taxa: 14

Diversity: 2.97
Equitability: 0.79

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	3	5	5	--	1
Percent	21.4	35.7	35.7	---	7.2

Beck's Biotic Index = 11

Station: SC-5
Replicate: 1

Location: Small tributary downstream from SC-6. 20 meters upstream from confluence with Swift Creek. Sunlit area in Power line right-of-way.

Date of Collection: November 8, 1977

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Oligochaeta	4	0.7	III	T,F
Hirudinea				
Helobdella stagnalis	1	0.2	III	T
Amphipoda				
Hyalella azteca	16	3.0	II	F
Ephemeroptera				
Stenonema smithae	180	33.6	I	I
Baetis sp.	28	5.2	V	
Odonata				
Gomphus sp.	3	0.6	II	F
Calopteryx sp.	4	0.7	II	
Trichoptera				
Chimarra perigua	72	13.4	I	I
Cheumatopsyche sp.	68	12.7	II	F
Cleoptera				
Heludidae sp.	1	0.2	V	
Stenelmis sp.	1	0.2	II	F,I
Diptera sp.				
Stenochironumus hilaris	1	0.2	I	I
Simulium sp.	68	12.7	I	I
Tabanus sp.	1	0.2	IV	I
Bezzia sp.	1	0.2	III	T
Polypedilum halterale	5	0.9	I	F,I
Polypedilum illinoense	49	9.1	II	F,I
Rheotaytarsus sp.	8	1.5	II	F
Tanytarsus sp.	4	0.7	III	F,I
Tribelos sp.	4	0.7	I	I
Eukiefferiella sp.	5	0.9	I	
Phaenopsectra sp.	10	1.9	V	I
Mollusca				
Sphaerium sp.	2	0.4	III	

Total Collected: 536
Number of Taxa: 23

Diversity: 3.07
Equitibility: 0.52

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	7	8	4	1	3
Percent	30.4	34.8	17.4	4.3	13.0

Beck's Biotic Index = 22

Station: SC-5
Replicate: 2
Location: Small tributary downstream from SC-6. 20 meters upstream from confluence with Swift Creek. Sunlit area in power-line right-of-way.
Date of Collection: November 8, 1977

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Hirudinea				
Helobdella stagnalis	3	1.0	III	T
Placobdella sp.	2	0.7	II	F
Isopods				
Asellus sp.	2	0.7	I	T,F,I
Amphipoda				
Hyalella azteca	11	3.6	II	F
Ephemeroptera				
Stenonema exiguum	1	0.3	I	I
Stenonema smithae	103	33.7	I	I
Baetis sp.	17	5.6	V	
Odonata				
Calopteryx sp.	4	1.3	II	
Enallagma sp.	1	0.3	II	F,I
Trichoptera				
Limnephilus sp.	1	0.3	V	
Chimarra sp.	14	4.6	I	I
Cheumatopsyche sp.	15	4.9	II	F
Diptera				
Simulium sp.	54	17.6	I	I
Tipula sp.	1	0.3	IV	I
Bezzia sp.	4	1.3	V	T
Cryptochironomus fulvus	1	0.3	III	F
Polypedilum illinoense	27	8.8	II	F,I
Tribelos sp.	11	3.6	I	I
Chironomus attenuatus	21	6.9	III	T,I
Conchopelopia sp.	2	0.7	V	F
Chironomus carus	5	1.6	III	T
Rheotanytarsus sp.	3	1.0	II	F,I
Mollusca				
Sphaerium sp.	2	0.7	III	F
Physa sp.	1	0.3	III	T

Total Collected: 306
Number of Taxa: 24

Diversity: 3.28
Equitibility: 0.58

Beck's Biotic Class

Classification	I	II	III	IV	V
Number of Taxa	6	7	6	1	4
Percent	25.0	29.2	25.0	4.2	16.7

Beck's Biotic Index = 19

Station: SC-5
Replicate: 3

Location: Small tributary downstream from SC-6. 20 meters upstream from confluence with Swift Creek. Sunlit area in power line right-of-way.
Date of Collection: November 8, 1977

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Hirudinea				
Placobdella sp.	1	0.2	II	
Helobdella stagnalis	3	0.6	III	T
Iospoda				
Asellus sp.	1	0.2	I	T,F,I
Amphipoda				
Hyalella azteca	42	9.2	II	F
Ephemeroptera				
Baetis spinosus	1	0.2	III	
Stenonema smithae	100	39.6	I	I
Odonata				
Pachydiplex longipennis	1	0.2	II	
Gomphus sp.	2	0.4	II	F
Calopteryx sp.	2	0.4	II	
Trichoptera				
Chimarra sp.	68	14.9	I	I
Cheumatopsyche sp.	20	4.4	II	F
Ptilostomis sp.	1	0.2	V	
Coleoptera				
Stenelmis sp.	24	5.3	II	F,I
Diptera				
Tipulidae sp.	1	0.2	IV	T,F
Simulium sp.	4	0.9	I	I
Polypedilum illinoense	24	5.3	II	F,I
Rheotanytarsus sp.	14	3.1	II	F,I
Rheotanytarsus exiguus	5	1.1	I	I
Tanytarsus sp.	10	2.2	II	F,I
Conchopelopia sp.	10	2.2	V	F
Metriocnemus sp.	2	0.4	V	
Polypedilum scalaenum	14	3.1	III	T,F
Clinotanypus pinguis	5	1.1	II	F,I
Mollusca				
Sphaerium sp.	18	4.9	III	F
Physa sp.	2	0.4	III	T

Total Collected: 455
Number of Taxa: 25

Diversity: 3.14
Equitibility: 0.50

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	5	1	5	1	3
Percent	20.0	44.0	20.0	4.0	12.0

Beck's Biotic Index = 21

Station: SC-6
Replicate: 1

Location: Approximately one mile upstream from SC-4. Shaded area in Mixed hardwood swamp with hyacinth mat.
Date of Collection: November 8, 1977

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Oligochaeta	49	16.1	III	T,F
Hirudinea				
Helobdella stagnalis	10	3.3	III	T
Decapoda				
Procambarus sp.	1	0.3	II	T,F,I
Ephemeroptera				
Caenis diminuta	49	16.1	III	T
Callibaetis floridanus	2	0.6	V	T
Odonata				
Agria sp.	12	3.9	I	I
Agrionidae sp.	3	1.0	V	
Libellulidae sp.	1	0.3	V	
Megaloptera				
Chauliodes sp.	1	0.3	V	
Coleoptera				
Peltodytes sp.	2	0.6	V	
Diptera				
Simulium sp.	1	0.3	I	I
Clinotanypus pinguis	1	0.3	II	F,I
Bezzia sp.	6	2.0	III	T
Palpomyia tibialis	1	0.3	III	F
Psectrocladius sp.	40	13.1	I	I
Dicrotendipes sp.	16	5.2	II	F,I
Chironomus carus	32	10.5	III	T,I
Chironomus attenuatus	8	2.6	III	T,I
Polypedilum illinoense	16	5.2	II	F,I
Parachironomus sp.	8	2.6	II	I
Cricotopus sp.	8	2.6	I	I
Cryptochironomus fulvus	16	5.2	III	T,I
Tanytarsus sp.	12	3.9	II	F,I
Labrundinia sp.	2	0.6	I	I
Polypedilum halterale	8	2.6	I	F,I

Total Collected: 305
Number of Taxa: 25

Diversity: 3.80
Equitibility: 0.81

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	6	6	8	-	5
Percent	24.0	24.0	32.0	-	20.0

Beck's Biotic Index = 18

Station: SC-6
Replicate: 2

Location: Approximately one mile upstream from SC-4. Shaded area in Mixed hardwood swamp with hyacinth mat.

Date of Collection: November 8, 1977

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Oligochaeta	22	35.5	III	T,F
Hirudinea				
Helobdella stagnalis	2	3.2	III	T
Ephemeroptera				
Callibaetis floridanus	5	8.1	V	T
Caenis diminuta	1	1.6	III	T
Odonata				
Agria sp.	1	1.6	I	I
Gomphus sp.	2	3.2	II	F
Coleoptera				
Dubiraphia sp.	2	3.2	II	F
Diptera				
Eristalis sp.	1	1.6	V	T
Clinotanypus pinguis	10	16.1	II	F,I
Bezzia sp.	7	11.3	III	T
Parachironomus sp.	2	3.2	II	F
Chironomus attenuatus	2	3.2	III	T,I
Tanytarsus sp.	1	1.6	II	F,I
Chironomus carus	3	4.8	III	T
Polypedilum illinoense	1	1.6	II	F,I

Total Collected: 62
Number of Taxa: 15

Diversity: 3.09
Equitibility: 0.80

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	1	6	6	-	2
Percent	6.7	40.0	40.0	-	13.3

Beck's Biotic Index = 8

Station: SC-6
Replicate: 3

Location: Approximately one mile upstream from SC-4. Shaded area in Mixed hardwood swamp with hyacinth mat.

Date of Collection: November 8, 1977

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Oligochaeta	25	36.2	III	T,F
Hirudinea				
Helobdella stagnalis	3	4.3	III	T
Ephemeroptera				
Caenis diminuta	2	2.9	III	T
Odonata				
Macromia sp.	2	2.9	I	I
Pachydiplax longipennis	1	1.4	II	
Diptera				
Bezzia sp.	9	13.0	III	T
Cryptochironomus fulvus	1	1.4	III	T,I
Clinotanypus pinguis	11	15.9	II	F,I
Polypedilum illinoense	2	2.9	II	F,I
Chironomus attenuatus	8	11.6	III	T,I
Chironomus carus	2	2.9	III	T
Psectrocladius sp.	2	2.9	I	I
Tanytarsus sp.	1	1.4	II	F,I

Total Collected:	69	Diversity:	2.90
Number of Taxa:	13	Equitibility	0.80

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	2	4	7	--	-
Percent	15.4	30.8	53.8	--	-

Beck's Biotic Index = 8

Station: SC-7
Replicate: 1

Location: At railroad trestle on Occidental property. Channelized portion with hyacinths. Sunlit area.
Date of Collection: November 8, 1977

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Oligochaeta	64	1.77	III	T,F
Hirudinea				
Helobdella stagnalis	1	0.02	III	T
Placobdella sp.	1	0.02	II	F
Odonata				
Agria sp.	1	0.02	II	I
Trichoptera				
Cheumatopsyche sp.	4	0.1	II	F
Polycentropus sp.	2	0.06	I	F,I
Coleoptera				
Dytiscidae sp.	1	0.02	V	T
Diptera				
Bezzia sp.	6	0.7	III	T
Chironomus attenuatus	2873	79.45	III	T,I
Chironomus carus	615	17.00	III	F
Pedinomus beckae	1	0.02	V	
Micropsectra sp.	17	0.47	V	I
Psectrocladius sp.	5	0.14	I	F
Parachironomus sp.	3	0.08	II	I
Labrundinia floridana	2	0.06	I	I
Tanytarsus sp.	15	0.41	II	F,I
Cricotopus bicintus	1	0.02	I	I
Cryptochironomus fulvus	1	0.02	III	T,I
Mollusca				
Ferrissia sp.	3	0.08	III	T,F

Total Collected: 3616
Number of Taxa: 19

Diversity: 0.96
Equitibility: 0.12

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	5	4	7	--	3
Percent	26.4	21.0	36.8	--	15.8

Beck's Biotic Index = 14

Station: SC-7
Replicate: 2

Location: At railroad trestle on Occidental property. Channelized portion with hyacinths. Sunlit area.
Date of Collection: November 8, 1977

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Oligochaeta	832	65.62	III	T,F
Coleoptera				
Dubiraphia sp.	1	0.08	II	F
Stenelmis sp.	1	0.08	II	F,I
Diptera				
Bezzia sp.	2	0.16	III	T
Chironomus attenuatus	249	19.6	III	T,I
Chironomus carus	183	14.4	III	T

Total Collected: 1268
Number of Taxa: 6

Diversity: 1.29
Equitibility: 0.50

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	--	2	4	--	--
Percent	--	33.3	66.7	--	--

Beck's Biotic Index = 2

Station: SC-7
Replicate: 3
Location: At railroad trestle on Occidental property. Channelized portion with hyacinths. Sunlit area.
Date of Collection: November 8, 1977

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Oligochaeta	93	5.66	III	T,F
Ephemeroptera				
Caenis diminuta	2	0.12	III	T
Trichoptera				
Cyrnellus sp.	1	0.06	V	F
Coleoptera				
Dytiscidae sp.	3	0.18	V	T
Diptera				
Bezzia sp.	30	1.82	III	T
Similium sp.	1	0.06	I	I
Clinotanypus pinguis	4	0.24	II	F
Chironomus attenuatus	1036	63.02	III	T,I
Chironomus carus	464	28.22	III	T
Cryptochironomus fulvus	1	0.06	III	F
Pedionomus beckae	1	0.06	V	
Psectrocladius sp.	3	0.18	I	F
Tanytarsus sp.	4	0.24	II	F,I
Mollusca				
Physa sp.	1	0.06	III	T

Total Collected: 1644
Number of Taxa: 14
Diversity: 1.39
Equitibility: 0.23

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	2	2	7	-	3
Percent	14.3	14.3	50.0	-	21.4

Beck's Biotic Index = 6

Station: SC-7 Location: At railraod trestle on Occidental
Replicate: 4 property. Channelized with hyacinths.
Sunlit area.
Date of Collection: November 8, 1977

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Oligochaeta	35	3.4	III	T,F
Ephemeroptera				
Caenis diminuta	1	0.1	III	T
Trichoptera				
Cheumatopsyche sp.	2	0.2	II	F
Coleoptera				
Berosus sp.	1	0.1	V	T
Diptera				
Simulium sp.	1	0.1	I	I
Chironomus attenuatus	825	79.3	III	T,I
Chironomus carus	103	9.9	III	T
Cricotopus sp.	8	0.8	I	I
Psectrocladius sp.	48	4.6	I	I
Micropsectra sp.	8	0.8	V	F,I
Parachironomus sp.	8	0.8	II	I
Mollusca				
Physa sp.	1	0.1	III	T

Total Collected: 1041
Number of Taxa: 12

Diversity: 1.18
Equitibility: 0.23

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	3	2	5	--	2
Percent	25.0	16.7	41.7	--	16.7

Beck's Biotic Index = 8

Station: SC-8 Location: Culvert on SR 137. Channelized portion.
Replicate: 1 Sunlit area.

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Oligochaeta	152	12.73	III	T,F
Hirudinea				
Placobdella sp.	1	0.08	II	F
Diptera				
Simulium sp.	1	0.08	I	I
Chironomus attenuatus	1040	87.10	III	T,I

Total Collected: 1194
Number of Taxa: 4

Diversity: 0.57
Equitibility: 0.43

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	1	1	2	--	--
Percent	25.0	25.0	50.0	--	--

Beck's Biotic Index = 3

Station: SC-8
Replicate: 2

Location: Culvert at SR 137. Channelized portion. Sunlit area.
Date of Collection:

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Oligochaeta	160	8.4	III	T,F
Diptera				
Chironomus attenuatus	1752	91.6	III	T,I

Total Collected:	1912	Diversity:	0.42
Number of Taxa:	2	Equitibility:	0.75

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	--	--	2	--	--
Percent	--	--	100.0	--	--

Beck's Biotic Index = 0

Station: SC-8
Replicate: 3

Location: Culvert at SR-137. Channelized portion, sunlit area.
Date of Collection: November 8, 1977

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Oligochaeta	416	23.2	III	T,F
Diptera				
Chironomus attenuatus	1204	67.2	III	T,I
Chironomus carus	172	9.6	III	T

Total Collected: 1792
Number of Taxa: 3

Diversity: 1.20
Equitibility: 0.93

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	-	-	3	-	-
Percent	-	-	100.0	-	-

Beck's Biotic Index = 0

Station: SC-9 Location: At bridge on Occidental property,
Replicate: 1 channelized, shaded by brush.
Date of Collection: November 8, 1977

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Oligochaeta	40	11.1	III	T,F
Hirudinea				
Helobdella stagnalis	1	0.3	III	T
Ephemeroptera				
Caenis diminuta	10	2.8	III	T
Stenonema smithae	2	0.5	I	I
Odonata				
Pachydiplax longipennis	1	0.3	II	
Trichoptera				
Phylocentropus placidus	2	0.5	V	F,I
Hydroptila sp.	1	0.3	I	I
Cyrnellus sp.	1	0.3	V	F
Leptocella sp.	2	0.5	II	F,I
Coleoptera				
Dubiraphia sp.	6	1.7	II	F
Diptera				
Tipulidae sp.	1	0.3	IV	T,F
Bezzia sp.	228	63.2	III	T
Polypedilum illinoense	24	6.6	II	F,I
Cryptochironomus fulvus	8	2.2	III	T,I
Glyptotendipes sp.	12	3.3	III	T
Chironomus carus	4	1.1	III	T
Cryptochironomus	1	0.3	III	T
Clinotanypus pinguis	16	4.4	II	F
Mollusca				
Sphaerium sp.	1	0.3	III	

Total Collected: 361
Number of Taxa: 19

Diversity: 2.12
Equitibility 0.30

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	2	5	9	1	2
Percent	10.5	26.3	47.4	5.3	10.5

Beck's Biotic Index = 9

Station: SC-9
Replicate: 2

Location: At bridge on Occidental property, channelized, shaded by brush.
Date of Collection: November 8, 1977

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Oligochaeta	10	22.7	III	T,F
Ephemeroptera				
Baetis sp.	2	4.5	V	
Caenis diminuta	3	6.8	III	T
Trichoptera				
Oecetis sp.	1	2.3	II	F
Coleoptera				
Dubiraphia sp.	4	9.1	II	F
Berosus sp.	1	2.3	V	T
Stenelmis sp.	2	4.5	II	F,I
Diptera				
Bezzia sp.	9	20.4	III	T
Clinotanypus pinguis	3	6.8	III	F,I
Polypedilum illinoense	2	4.5	II	F,I
Tanytarsus sp.	1	2.3	II	F,I
Cricotopus sp.	1	2.3	I	I
Labrundinia sp.	1	2.3	I	I
Polypedilum scalaenum	1	2.3	III	T,F
Mollusca				
Elliptio sp.	3	6.8	V	

Total Collected: 44
Number of Taxa: 15

Diversity: 3.41
Equitibility: 1.01

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	2	5	5	-	3
Percent	13.3	33.3	33.3	-	20.0

Beck's Biotic Index = 9

Station: SC-9 Location: At bridge on Occidental property,
Replicate: 3 channelized, shaded by brush.
Date of Collection: November 8, 1977

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Oligochaeta	50	60.2	III	T,F
Ephemeroptera				
Caenis diminuta	10	12.0	III	T
Odonata				
Agria sp.	3	3.6	I	I
Trichoptera				
Athripsodes sp.	1	1.2	V	I
Coleoptera				
Dubiraphia sp.	4	4.8	II	F
Diptera				
Bezzia sp.	1	1.2	III	T
Clinotanypus pinguis	2	2.4	II	F,I
Polypedilum illinoense	2	2.4	II	F,I
Cryptochironomus fulvus	2	2.4	III	T,I
Chironomus sp.	1	1.2	III	T,F
Tanytarsus sp.	2	2.4	II	F,I
Paralauterborniella sp.	1	1.2	V	
Mollusca				
Elliptio sp.	1	1.2	V	
Sphaerium sp.	3	3.6	III	F

Total Collected: 83
Number of Taxa: 14

Diversity: 2.27
Equitibility: 0.46

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	1	4	6	-	3
Percent	7.1	28.6	42.9	-	21.4

Beck's Biotic Index = 6

Station: SC-9.5
Replicate: 1

Location: At water control structure on Occidental property. Hyacinth mat in sunlit area.
Date of Collection: November 8, 1977

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Oligochaeta	76	66.1	III	T,F
Ephemeroptera				
Callibaetis floridanus	2	1.7	V	T
Baetis sp.	1	0.9	V	
Trichoptera				
Oxyethira sp.	1	0.9	I	I
Coleoptera				
Hydrophilidae sp.	2	1.7	V	T
Diptera				
Culex sp.	4	3.8	V	T
Bezzia sp.	4	3.8	III	T
Rheotanytarsus	2	1.7	II	F
Polypedilum tritum	5	4.3	II	F
Chironomus attenuatus	2	1.7	III	T
Pentaneura inculata	4	3.8	I	F,I
Polypedilum illinoense	3	2.6	II	F,I
Tanytarsus sp.	4	3.8	II	F,I
Cryptochironomus fulvus	2	1.7	III	T,I
Phaenopsectra sp.	3	2.6	V	I

Total Collected: 115
Number of Taxa: 15

Diversity: 2.17
Equitibility: 0.40

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	2	4	4	-	5
Percent	13.3	26.7	26.7	-	33.3

Beck's Biotic Index = 8

Station: SC-9.5
Replicate: 2

Location: At water control structure on Occidental property. Hyacinth mat in sunlit area.
Date of Collection: November 8, 1977

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Oligochaeta	16	34.8	III	T,F
Odonata				
Agrionidae	1	2.2	V	
Diptera				
Calex sp.	1	2.2	V	
Bezzia sp.	5	10.9	III	T
Crytochironomus fulvus	2	4.3	III	T,I
Ablabesmyia peelensis	3	6.5	II	F
Tanytarsus sp. (A)	3	6.5	II	F,I
Tanytarsus sp. (B)	5	10.9	II	F,I
Chironomus sp.	3	6.5	III	T,F
Polypedilum illinoense	4	8.7	II	F,I
Pseudochironomus sp.	3	6.5	V	I

Total Collected: 46
Number of Taxa: 11

Diversity: 3.00
Equitibility: 1.03

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	-	4	4	-	3
Percent	-	36.4	36.4	-	27.3

Beck's Biotic Index = 4

Station: SC-9.5
Replicate: 3
Location: At water control structure on Occidental property. Hyacinth mat in sunlit area.
Date of Collection: November 8, 1977

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Oligochaeta	432	44.4	III	T,F
Amphipoda				
Hyalella azteca	15	1.5	II	F
Decapoda				
Palaemonetes paludosus	2	0.2	II	F
Ephemeroptera				
Callibaetis floridanus	8	0.8	V	T
Caenis diminuta	2	0.2	III	T
Odonata				
Pachydiplax longipennis	1	0.1	II	
Coleoptera				
Peltodytes sp.	24	2.5	V	
Diptera				
Bezzia sp.	48	4.9	III	T
Harnischia edwardsi	105	10.8	V	
Tanytarsus sp. (A)	36	3.7	II	F,I
Tanytarsus sp. (B)	18	1.8	II	F,I
Eukiefferiella sp.	27	2.8	I	
Chironomus attenuatus	54	5.5	III	T,I
Chironomus carus	108	11.1	III	T
Clinotanypus pinguis	13	1.3	II	F,I
Polypedilum illinoense	53	5.4	II	F,I
Polypedilum sp.	1	0.1	II	F,I
Labrundinia sp.	13	1.3	I	I
Ablabesmyia peelensis	14	1.4	I	F

Total Collected: 974
Number of Taxa: 19
Diversity: 2.91
Equitibility: 0.55

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	3	8	5	-	3
Percent	15.8	42.1	26.3	-	15.8

Beck's Biotic Index = 14

Station No: CB-1 Location: Approximately 2.3 miles downstream from
Replicate: 1 CB-3 at sink. Shaded area in Southern
mixed hardwoods.
Collection Date: November 3, 1977

Taxon	Number Collected	%	Beck's Biotic Index	Pollution Tolerance Classification
Oligochaeta	1	2.5	III	T,F
Ephemeroptera				
Baetis sp.	1	2.5	V	
Odonata				
Aeshna sp.	1	2.5	V	
Somatuchlora sp.	2	5.0	V	
Trichoptera				
Cheumatopsyche sp.	5	12.5	II	F
Coleoptera				
Stenelmis sp.	2	5.0	II	T,F,I
Diptera				
Bezzia sp.	1	2.5	III	T
Conchopelopia sp.	4	10.0	V	F
Tanytarsus sp.	1	2.5	II	F,I
Mollusca				
Physa sp.	12	30.0	III	T

Total Collected	40		Diversity	2.69
Number of Taxa	10		Equitibility	0.90

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	--	3	3	--	4
Percent	--	30.0	30.0	--	40.0

Beck's Biotic Index = 3

Station:	CB-1	Location:	Approximately 2.3 miles downstream from CB-3 at sink. Shaded area in Southern mixed hardwoods.
Replicate:	2	Date of Collection:	November 3, 1977

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Oligochaeta	3	21.4	III	T,F
Decapoda				
Procambarus sp.	1	7.1	II	T,F,I
Diptera				
Bezzia sp.	1	7.1	III	T
Conchapelopia sp.	1	7.1	V	F
Chironomus attenuatus	7	50.0	III	T,I
Chironomus carus	1	7.1	III	F,I

Total Collected: 14
Number of Taxa: 6

Diversity: 2.06
Equitibility: 0.92

Beck's Biotic Class

Classification	I	II	III	IV	V
Number of Taxa	--	1	4	--	1
Percent	--	16.7	66.6	--	16.7

Beck's Biotic Index = 1

Station No: CB-2 Location: Approximately 1.7 miles downstream from CB-3
Replicate: 1 at bridge on county road. Shaded area in Southern mixed hardwoods.
Collection Date: November 3, 1977

Taxon	Number Collected	%	Beck's Biotic Index	Pollution Tolerance Classification
Oligochaeta	47	52.8	III	T,F
Trichoptera				
Phylocentropus placidus	1	1.1	V	
Diptera				
Bezzia sp.	3	3.4	III	T
Procladius sp.	3	3.4	II	T,F
Chironomus attenuatus	8	9.0	III	T,I
Itarnischia boydi	13	14.6	V	
Micropsectra sp.	4	4.5	V	F,I
Tanytarsus sp.	9	10.1	II	F,I
Mollusca				
Elliptio	1	1.1	V	

Total Collected	89	Diversity	2.21
Number of Taxa	9	Equitibility	0.72

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	--	2	3	--	4
Percent	--	22.2	33.3	--	44.4

Beck's Biotic Index = 2

Station No: CB-2 Location: Approximately 1.7 miles downstream from CB-3
Replicate: 2 at bridge on county road. Shaded area in
Southern mixed hardwoods.
Collection Date: November 3, 1977

Taxon	Number Collected	%	Beck's Biotic Index	Pollution Tolerance Classification
Oligochaeta	20	9.6	III	T,F
Odonata				
Macromia sp.	1	0.5	II	F,I
Gomphus sp.	1	0.5	II	F,I
Trichoptera				
Oecetis sp.	2	0.9	II	F
Cyrnellus sp.	1	0.5	V	F
Coleoptera				
Ancyronyx variegatus	2	0.9	V	I
Diptera				
Bezzia sp.	3	1.4	III	T
Procladius sp.	8	3.8	II	T,F
Chironomus attenuatus	18	8.6	III	T,I
Dicrotendipes sp.	48	23.0	II	T,F,I
Harnischia sp.	27	12.9	V	F,I
Tibelos sp.	10	4.8	I	
Ablabesmyia ornata	12	5.7	I	I
Micropsectra sp.	32	15.3	V	F,I
Tanytarsus sp.	16	7.7	II	F,I
Mollusca				
Sphaerium sp.	8	3.8	III	

Total Collected	209	Diversity	3.33
Number of Taxa	16	Equitibility	0.88

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	3	5	4	--	4
Percent	18.8	31.2	25.0	--	25.0

Beck's Biotic Index = 11

Station: CB-2
Replicate: 3

Location: Approximately 1.7 miles downstream from CB-3 at bridge on County road. Shaded area in Southern mixed hardwoods.

Date of Collection: November 3, 1977

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Oligochaeta	10	17.5	III	T,F
Odonata				
Gomphus sp.	1	1.8	II	F
Pachydiplax longipennis	1	1.8	II	
Trichoptera				
Phylocentropus sp.	3	5.3	V	F,I
Megaloptera				
Sialis sp.	2	3.5	V	F
Diptera				
Bezzia sp.	5	8.8	III	T
Procladius sp.	11	19.3	II	T,F
Clinotanypus pinguis	4	7.0	II	F,I
Tanytarsus sp.	3	5.3	II	F,I
Dicrotendipes sp.	5	8.8	II	F,I
Chironomus attenuatus	5	8.8	III	T,I
Micropsectra sp.	1	1.8	V	F,I
Harnischia edwardsi	1	1.8	V	
Mollusca				
Ellipitio sp.	3	5.3	V	
Sphaerium sp.	2	3.5	III	F

Total Collected: 57
Number of Taxa: 15
Diversity: 3.51
Equitibility: 1.08

Beck's Biotic Class

Classification	I	II	III	IV	V
Number of Taxa	--	6	4	--	5
Percent	--	40.0	26.7	--	33.3

Beck's Biotic Index = 6

Station No: CB-3
Replicate: 1

Location: At S.R. 132 bridge. Shaded area in Southern mixed hardwoods.
Collection Date: November 3, 1977

Taxon	Number Collected	%	Beck's Biotic Index	Pollution Tolerance Classification
Oligochaeta	51	63.0	III	T,F
Isopoda				
Asellus sp.	2	2.5	I	T,F,I
Odonata				
Amphiagrion sp.	1	1.2	V	
Ephemeroptera				
Baetis sp.	1	1.2	V	
Coleoptera				
Dubiraphia sp.	1	1.2	II	F
Diptera				
Bezzia sp.	2	2.5	III	T
Clinotanypus pinguis	4	4.9	II	F
Stenochironomus hilaris	1	1.2	I	I
Ablabesmyia aspera	1	1.2	I	I
Micropsectra sp.	1	1.2	V	F,I
Polypedilum halterale	3	3.7	I	F,I
Tribelos sp.	4	4.9	I	I
Harnischia boydi	3	3.7	V	
Tanytarsus sp.	2	2.5	II	F,I
Procladius sp.	4	4.9	II	T,F

Total Collected 81
Number of Taxa 15

Diversity 2.28
Equitibility 0.44

Classification	I	II	III	IV	V
Number of Taxa	5	4	2	--	4
Percent	33.3	26.7	13.3	--	26.7

Beck's Biotic Index = 14

Station No: CB-3 Location: At S.R. 132 bridge. Shaded area in
Replicate: 2 Southern mixed hardwoods.
Collection Date: November 3, 1977

Taxon	Number Collected	%	Beck's Biotic Index	Pollution Tolerance Classification
Oligochaeta	49	80.3	III	T,F
Amphipoda				
Hyallela azteca	1	1.6	II	F
Odonata				
Pachydiplax longipennis	1	1.6	II	
Diptera				
Bezzia sp.	2	3.3	III	T
Tribelos sp.	1	1.6	I	
Tanytarsus sp.	3	4.9	II	F,I
Micropsectra sp.	1	1.6	V	F,I
Harnischia boydi	1	1.6	V	
Chironomus attenuatus	1	1.6	III	T,I
Mollusca				
Sphaerium transversum	1	1.6	III	

Total Collected	61	Diversity	1.31
Number of Taxa	10	Equitibility	0.30

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	1	3	4	--	2
Percent	10.0	30.3	40.0	--	20.0

Beck's Biotic Index = 5

Station No: CB-3 Location: At S.R. 132 bridge. Shaded area in
Replicate: 3 Southern mixed hardwoods.
Collection Date: November 3, 1977

Taxon	Number Collected	%	Beck's Biotic Index	Pollution Tolerance Classification
Oligochaeta	17	54.8	III	T,F
Megaloptera				
Sialis sp.	1	3.2	V	
Diptera				
Procladius sp.	3	9.7	II	T,F
Clinotanypus pinguis	3	9.7	II	F
Polypedilum halterale	2	6.4	I	F,I
Micropsectra sp.	1	3.2	V	F,I
Chironomus attenuatus	1	3.2	III	T,I
Mollusca				
Sphaerium transversum	1	3.2	III	
Elliptio	2	6.4	V	

Total Collected	31	Diversity	2.28
Number of Taxa	9	Equitibility	0.73

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	1	2	3	--	3
Percent	11.1	22.2	33.3	--	33.3

Beck's Biotic Index = 4

Station: CB-3
Replicate: 4

Location: At SR 132 bridge. Shaded area in Southern mixed hardwoods.
Date of Collection: November 3, 1977

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Oligochaeta	9	12.0	III	T,F
Ephemeroptera				
Stenonema smithae	2	2.7	I	I
Baetis spinosus	4	5.3	V	
Odonata				
Progomphus obscurus	1	1.3	I	I
Trichoptera				
Cheumatopsyche sp.	4	5.3	II	F
Coleoptera				
Stenelmis sp.	1	1.3	II	F,I
Diptera				
Psectrocladius sp.	15	20.0	I	I
Procladius sp.	1	1.3	II	T,F
Cricotopus sp.	30	40.0	I	I
Labrundinia sp.	1	1.3	I	I
Tanytarsus sp.	1	1.3	II	F,I
Micropsectra sp.	2	2.7	V	F,I
Mollusca				
Pisidium sp.	1	1.3	III	F
Physa sp.	3	4.0	III	T

Total Collected: 75
Number of Taxa: 14

Diversity: 2.77
Equitibility: 0.68

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	5	4	3	--	2
Percent	35.7	28.6	21.4	--	14.3

Beck's Biotic Index = 14

Station: RC-2
Replicate: 1

Location: 1.5 miles upstream from confluence with Suwannee River, upstream from permanent USGS guaging station. Shaded areas in Southern mixed hardwoods.

Date of Collection: November 3, 1977

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Oligochaeta	26	31.3	III	T,F
Amphipoda				
Hyallella azteca	1	1.2	II	F
Ephemeroptera				
Stenonema smithae	3	3.6	I	I
Habrophlebiodes sp.	2	2.4	V	
Ephemerella sp.	1	1.2	V	
Odonata				
Progomphus obscurus	1	1.2	I	F
Agria sp.	1	1.2	I	I
Trichoptera				
Cyrnellus sp.	1	1.2	V	F
Oecetis sp.	1	1.2	II	F
Phylocentropus sp.	3	3.6	V	F,I
Coleoptera				
Stenelmis sp.	14	16.9	II	F,I
Hydrophilidae sp.	2	2.4	V	T
Dubiraphia sp.	1	1.2	II	T
Diptera				
Bezzia sp.	1	1.2	III	T
Criptochironomus fulvus	2	2.4	III	F
Simulium sp.	1	1.2	I	T
Corynoneura sp.	1	1.2	I	
Rheotanytarsus sp.	1	1.2	II	F
Ablabesmyia ornata	1	1.2	I	I
Polypedilum tritum	1	1.2	II	F
Micropsectra sp.	4	4.8	V	F,I
Cricotopus sp.	10	12.0	I	I
Thenemanniella sp.	1	1.2	I	I
Polypedilum halterale	2	2.4	I	F,I
Tanytarsus sp.	1	1.2	II	F,I

Total Collected: 83
Number of Taxa: 25
Diversity: 3.55
Equitibility: 0.68

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	9	7	3	--	6
Percent	36.0	28.0	12.0	--	24.0

Beck's Biotic Index = 25

Station: RC-2 Location: 1.5 miles upstream from confluence
Replicate: 2 with Suwannee River, upstream from
USGS guaging station. Shaded area
in Southern mixed hardwoods.
Date of Collection: November 3, 1977

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Oligochaeta	7	21.2	III	T,F
Amphipoda				
Hyallela ozteca	2	6.1	II	F
Ephemeroptera				
Habrophlibiodes sp.	1	3.0	V	
Ephemeralla sp.	2	6.1	V	
Stenonema smithae	1	3.0	I	I
Odonata				
Pachydiplax longipennis	1	3.0	II	
Gomphus sp.	1	3.0	II	F
Trichoptera				
Polycentropus sp.	1	3.0	I	F,I
Oecetis sp.	2	6.1	II	F
Coleoptera				
Stenelmis sp.	1	3.0	II	F,I
Diptera				
Bezzia sp.	1	3.0	III	T
Ablabesmyia ornata	2	6.1	I	I
Cricutupus sp.	11	33.3	I	I

Total Collected: 33 Diversity: 3.05
Number of Taxa: 13 Equitibility: 0.92

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	4	5	2	--	2
Percent	30.8	38.5	15.4	--	15.4

Beck's Biotic Index = 13

Station: RC-2
Replicate: 3

Location: 1.5 miles upstream from confluence with Suwannee River, upstream from permanent USGS guaging station. Shaded area in Southern mixed hardwoods.

Date of Collection: November 3, 1977

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Oligogochaeta	64	59.8	III	T,F
Decapoda				
Procambarus sp.	1	0.9	II	T,F,I
Ephemeroptera				
Ephemerella sp.	1	0.9	V	
Stenonema smithae	1	0.9	I	I
Odonota				
Progamphus obsenrus	3	2.8	I	F
Trichoptera				
Oecetis sp.	2	1.9	II	F
Cheumatopsyche sp.	2	1.9	II	F
Megaloptera				
Sialis sp.	1	0.9	V	
Coleoptera				
Dubiraphia sp.	1	0.9	II	T
Dytiscidae sp.	1	0.9	V	
Stenelmis sp.	2	1.9	II	F,I
Diptera				
Palpomyia tibialis	1	0.9	III	
Conchopelopia sp.	4	3.7	V	F
Polypedilum halterale	2	1.9	I	F,I
Cricotopus sp.	6	5.6	I	I
Stenochironomus hilaris	1	0.9	I	I
Tanytarsus sp.	3	2.8	II	F,I
Rheotanytarsus sp.	1	0.9	II	F
Cladotanytarsus sp.	2	1.9	II	F
Ablebesmyia ornata	2	1.9	I	I
Bezzia sp.	6	5.6	III	T

Total Collected: 107
Number of Taxa: 21

Diversity: 2.59
Equitbility: 0.38

Beck's Biotic Class

Classification	I	II	III	IV	V
Number of Taxa	6	8	3	--	4
Percent	28.6	38.1	14.3	--	19.1

Beck's Biotic Index = 20

Station No: HC-1 Location: At bridge on S.R. 135. Shaded area in Southern mixed hardwoods.
Replicate: 1
Collection Date: November 3, 1977

Taxon	Number Collected	%	Beck's Biotic Index	Pollution Tolerance Classification
Oligochaeta	5	5.4	III	T,F
Ephemeroptera				
Baetis sp.	1	1.1	V	
Odonata				
Progomphus obscurus	1	1.1	I	I
Gomphus sp.	1	1.1	II	F
Coleoptera				
Stenelmis sp.	7	7.5	II	T,F,I
Diptera				
Tipulidae sp.	1	1.1	IV	T,F
Bezzia sp.	17	18.3	III	T
Cryptochironomus ponderosus	3	3.2	III	T
Micropsecta sp.	12	12.9	V	F,I
Conchopelopia sp.	1	1.1	V	F
Cladotanytarsus sp.	3	3.2	II	F
Polypedilum halterale	24	25.8	I	F,I
Tanytarsus sp.	10	10.8	II	F,I
Rheotanytarsus sp.	2	2.1	II	F
Chironomus attenuatus	4	4.3	III	T,I
Mollusca				
Physa sp.	1	1.1	III	T

Total Collected	93	Diversity	3.24
Number of Taxa	16	Equitibility	0.84

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	2	5	5	1	3
Percent	12.5	31.2	31.2	6.2	18.8

Beck's Biotic Index = 9

Station No: HC-1 Location: At bridge on S.R. 135. Shaded area in
Replicate: 2 Southern mixed hardwoods.
Collection Date: November 3, 1977

Taxon	Number Collected	%	Beck's Biotic Index	Pollution Tolerance Classification
Oligochaeta	7	9.7	III	T,F
Amphipoda				
Hyallela azteca	7	9.7	II	F
Decapoda				
Procumbarus sp.	2	2.8	II	T,F,I
Ephemeroptera				
Baetis sp.	1	1.4	V	
Caenis diminute	1	1.4	III	T
Coleoptera				
Suphisellus sp.	1	1.4	V	
Stanelmis sp.	3	4.2	II	T,F,I
Dubiraphic sp.	1	1.4	II	F
Diptera				
Bezzia sp.	10	13.9	III	T
Stenochironomus hilaris	1	1.4	I	I
Coelotanypus sp.	2	2.8	V	T,F,I
Rheotanytarsus sp.	5	6.9	II	F
Polypedilum halterale	24	33.3	I	F,I
Tanytarsus sp.	5	6.9	I	F,I
Cryptochironomus ponderosus	2	2.8	III	T

Total Collected	72	Diversity	3.16
Number of Taxa	15	Equitibility	0.84

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	2	6	4	--	3
Percent	13.3	40.0	26.7	--	20.0

Beck's Biotic Index = 10

Station No: HC-1 Location: At bridge on S.R. 135. Shaded area in
Replicate: 3 Southern mixed hardwoods.
Collection Date: November 3, 1977

Taxon	Number Collected	%	Beck's Biotic Index	Pollution Tolerance Classification
Oligochaeta	7	6.7	III	T,F
Hirudinea				
Helobdella stagnalis	1	1.0	III	T
Amphipoda				
Hyallela azteca	5	4.8	II	F
Coleoptera				
Peltodytes sp.	1	1.0	IV	
Suphisellus sp.	2	1.9	V	
Stenelmis sp.	1	1.0	II	T,F,I
Diptera				
Bezzia sp.	5	4.8	III	T
Cryptochironomus ponderosus	9	8.6	III	T
Polypedilum halterale	35	33.7	I	F,I
Polypedilum tritum	3	2.9	II	F
Polypedilum fallax	2	1.9	I	F,I
Harnischia boydi	2	1.9	V	
Clinotanypus pinguis	1	1.0	II	F
Micropsectra sp.	4	3.8	V	F,I
Tanytarsus sp.	18	17.3	II	F,I
Tribelos sp.	4	3.8	I	
Mollusca				
Margaritifera sp.	2	1.9	V	
Physa sp.	2	1.9	III	T

Total Collected 104 Diversity 3.27
Number of Taxa 18 Equitibility 0.78

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	3	5	5	1	4
Percent	16.7	27.8	27.8	5.5	22.2

Beck's Biotic Index = 11

Station No: RO-2
Replicate: 1

Location: 1.8 miles upstream from confluence with
Suwannee River at S.R. 135 bridge.
Shaded area in Southern mixed hardwoods.
Collection Date: November 3, 1977

Taxon	Number Collected	%	Beck's Biotic Index	Pollution Tolerance Classification
Isopoda				
Asellus sp.	3	4.8	I	T,F,I
Decapoda				
Procambarus sp.	3	4.8	II	T,F,I
Odonata				
Pachydiplax longipennis	2	3.2	II	
Megaloptera				
Sialis sp.	1	1.6	V	
Diptera				
Stenochironamus hilaris	3	4.8	I	I
Procladius sp.	3	4.8	II	T,F
Labrundinia sp.	4	6.3	I	F,I
Dicrotendipes sp.	11	17.5	II	T,F,I
Conchapelopea sp.	2	3.2	V	F
Chironomus attenuatus	3	4.8	III	T,I
Rheotanytarsus sp.	6	9.5	II	F
Polypedilum tritum	4	6.3	II	F
Psectrocladius sp.	3	4.8	I	F
Polypedilum fallox	1	1.6	I	F,I
Micropsectra sp.	3	4.8	V	F,I
Mollusca				
Physa sp.	9	14.3	III	T
Sphaerium transversum	2	3.2	III	

Total Collected	63	Diversity	3.80
Number of Taxa	17	Equitibility	1.18

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	5	6	3	--	3
Percent	29.4	35.3	17.6	--	17.6

Beck's Biotic Index = 16

Station No: RO-2 Location: 1.8 miles upstream from confluence with
Replicate: 2 Suwannee River at S.R. 135 bridge.
Shaded area in Southern mixed hardwoods.
Collection Date: November 3, 1977

Taxon	Number Collected	%	Beck's Biotic Index	Pollution Tolerance Classification
Oligochaeta	10	7.1	III	T,F
Amphipoda				
Hyacella azteca	5	3.6	II	F
Isopoda				
Asellus sp.	9	6.4	I	T,F,I
Decapoda				
Procambarus sp.	4	2.8	II	T,F,I
Odonata				
Agria sp.	1	0.7	I	I
Pachydiplax longipennis	2	1.4	II	
Trichoptera				
Phylocentropus placidus	2	1.4	V	F,I
Cyrnellus sp.	2	1.4	V	F
Coleoptera				
Hydrophilidae sp.	1	0.7	V	
Diptera				
Bezzia sp.	3	2.1	III	T
Palpomyia tibialis	1	0.7	III	F
Stenochironomus hilaris	2	1.4	I	I
Procladius sp.	4	2.8	II	T,F
Chironomus attenuatus	14	10.0	III	T,I
Micropsectra sp.	8	5.7	V	F,I
Dicrotendipes sp.	34	24.3	II	T,F,I
Canchopelopia sp.	2	1.4	V	F
Ablabesmyia sp.	7	5.0	I	I
Polypedilum halterale	4	2.8	I	F,I
Tanytarsus sp.	6	4.3	II	F,I
Rheotanytarsus sp.	3	2.1	II	F
Megaloptera				
Sialis sp.	8	5.7	V	
Mollusca				
Physa sp.	5	3.6	III	T
Sphaerium transversum	3	2.1	III	

Total Collected	140	Diversity	3.97
Number of Taxa	24	Equitibility	1.10

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	5	7	6	--	6
Percent	20.8	29.2	25.0	--	25.0

Beck's Biotic Index = 17

Station No: RO-2 Location: 1.8 miles upstream from confluence with
Replicate: 3 Suwannee River at S.R. 135 bridge.
Shaded area in Southern mixed hardwoods.
Collection Date: November 3, 1977

Taxon	Number Collected	%	Beck's Biotic Index	Pollution Tolerance Classification
Decapoda				
Procambarus sp.	2	0.9	II	T,F,I
Odonata				
Gomphus sp.	1	0.5	II	F
Tetragoneuria sp.	1	0.5	V	
Libellula sp.	1	0.5	V	F
Enallagma sp.	1	0.5	II	F
Trichoptera				
Phylocentropus placidus	4	1.9	V	F,I
Megaloptera				
Sialis sp.	3	1.4	V	
Coleoptera				
Dubiraphia sp.	1	0.5	II	F
Diptera				
Stenochironomus hilaris	2	0.9	I	I
Procladius sp.	2	0.9	II	T,F
Cryptochironomus ponderosus	1	0.5	III	T
Dicrotendipes sp.	144	67.3	II	T,F,I
Chironomus attenuatus	16	7.5	III	T,I
Tanytarsus sp.	8	3.7	I	F,I
Rheotanytarsus sp.	4	1.9	II	F
Tribelos sp.	8	3.7	I	I
Mollusca				
Physa sp.	10	4.7	III	T
Sphaerium transversum	5	2.3	III	

Total Collected 214 Diversity 2.06
Number of Taxa 18 Equitibility 0.31

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	2	8	4	--	4
Percent	11.1	44.4	22.0	--	22.0

Beck's Biotic Index = 12

Station No: SR-7 Location: Upstream on Suwannee River from confluence with Swift Creek.
Replicate: 1
Collection Date: November 4, 1977

Taxon	Number Collected	%	Beck's Biotic Index	Pollution Tolerance Classification
Nematoda	1	3.0	II	F
Decapoda				
Procambarus sp.	1	3.0	II	T,F,I
Megaloptera				
Corydalus cornutus	1	3.0	I	F,I
Trichoptera				
Triaenodes sp.	1	3.0	V	
Coleoptera				
Stenelmis sp.	1	3.0	II	F,I
Diptera				
Dicrotendipes sp.	4	12.1	II	F,I
Tanytarsus sp.	2	6.1	II	F,I
Micropsectra sp.	6	18.2	V	F,I
Polypedilum halterale	4	12.1	I	F,I
Stempellina sp.	2	6.1	V	
Pseudochironomus sp.	2	6.1	V	I
Cladotanytarsus sp.	8	24.2	II	F

Total Collected	33	Diversity	3.18
Number of Taxa	12	Equitibility	1.08

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	2	6	---	--	4
Percent	25.0	50.0	---	--	33.3

Beck's Biotic Index = 10

Station No: SR-7 Location: Upstream on Suwannee River from confluence with Swift Creek.
Replicate: 2
Collection Date: November 4, 1977

Taxon	Number Collected	%	Beck's Biotic Index	Pollution Tolerance Classification
Oligochaeta	28	34.6	III	T,F
Decapoda				
Procambarus sp.	1	1.2	II	T,F,I
Ephemeroptera				
Stenonema proximum	2	2.5	I	I
Trichoptera				
Macronemum sp.	6	7.4	I	I
Coleoptera				
Stenelmis sp.	5	6.2	II	F,I
Diptera				
Bezzia sp.	2	2.5	III	T
Cryptochironomus ponderosus	2	2.5	III	T
Polypedilum tritum	7	8.6	II	F
Psectrocladius sp.	2	2.5	I	F
Dicrotendipes sp.	3	3.7	II	T,F,I
Pseudochironomus sp.	3	3.7	V	I
Cladotanytarsus sp.	11	13.6	II	F
Conchopelopia sp.	2	2.5	V	F
Micropsectra sp.	3	3.7	V	F,I
Harnischia boydi	2	2.5	V	
Cricotopus bicinctus	2	2.5	I	I

Total Collected 81
Number of Taxa 16

Diversity 3.28
Equitibility 0.88

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	4	5	3	--	4
Percent	25.0	31.3	18.7	--	25.0

Beck's Biotic Index = 13

Station No: SR-7   Location: Upstream on Suwannee River from confluence
Reolicate: 3   with Swift Creek.
Collection Date: November 4, 1977

Taxon	Number Collected	%	Beck's Biotic Index	Pollution Tolerance Classification
Oligochaeta	86	86.0	III	T,F
Trichoptera				
Limnephilus sp.	1	1.0	V	
Coleoptera				
Stenelmis sp.	1	1.0	II	F,I
Diptera				
Bezzia sp.	4	4.0	III	T
Tribelos sp.	2	2.0	I	I
Rheotanytarsus sp.	3	3.0	II	F
Micropsectra sp.	2	2.0	V	F,I
Cladotanytarsus sp.	1	1.0	II	F

Total Collected	100	Diversity	0.95
Number of Taxa	8	Equitibility	0.29

Classification	I	II	III	IV	V
	Beck's Biotic Class				
Number of Taxa	1	3	2	--	2
Percent	12.5	37.5	25.0	--	25.0

Beck's Biotic Index = 5

Station No: SR-8 Location: Downstream on Suwannee River from confluence with Swift Creek.
Replicate: 1
Collection Date: November 4, 1977

Taxon	Number Collected	%	Beck's Biotic Index	Pollution Tolerance Classification
Oligochaeta	7	10.0	III	T,F
Ephemeroptera				
Baetis sp.	1	1.4	V	I
Odonata				
Progomphus obscurus	1	1.4	I	I
Progomphus sp.	1	1.4	I	I
Trichoptera				
Hydropsyche frisoni	4	5.7	I	I
Coleoptera				
Stenelmis sp.	2	2.9	II	F,I
Diptera				
Cryptochironomus ponderosus	1	1.4	III	T
Polypedilum tritum	21	30.0	II	F
Conchopelopia sp.	2	2.9	I	F
Eukiefferiella sp.	3	4.3	V	
Cricotopus sp.	6	8.6	I	I
Stictochironomus sp.	3	4.3	I	I
Rheotanytarsus sp.	18	25.7	II	F

Total Collected 70
Number of Taxa 13
Diversity 2.93
Equitibility 0.79

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	6	3	2	--	2
Percent	46.2	23.1	15.4	--	15.4

Beck's Biotic Index = 15

Station No: SR-8 Location: Downstream on Suwannee River from confluence with Swift Creek.
Replicate: 2
Collection Date: November 4, 1977

Taxon	Number Collected	%	Beck's Biotic Index	Pollution Tolerance Classification
Oligochaeta	1	1.5	III	T,F
Decapoda				
Procambarus sp.	2	3.1	II	T,F,I
Diptera				
Bezzia sp.	1	1.5	III	T
Cricotopus sp.	6	9.2	I	I
Polypedilum tritum	12	18.5	II	F
Rheotanytarsus sp.	30	46.1	II	F
Polypedilum halterale	6	9.2	I	F,I
Tanytarsus sp.	4	6.2	II	F,I
Eukiefferiella sp.	3	4.6	I	

Total Collected	65	Diversity	2.39
Number of Taxa	9	Equitibility	0.78

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	3	4	2	--	--
Percent	33.3	44.4	22.2	--	--

Beck's Biotic Index = 10

Station No: SR-8 Location: Downstream on Suwannee River from confluence with Swift Creek.
Replicate: 3
Collection Date: November 4, 1977

Taxon	Number Collected	%	Beck's Biotic Index	Pollution Tolerance Classification
Oligochaeta	1	1.4	III	T,F
Ephemeroptera				
Baetis sp.	1	1.4	V	
Diptera				
Cryptochironomus ponderosus	1	1.4	III	T
Polypedilum tritum	29	40.8	II	F
Micropsectra sp.	4	5.6	V	F,I
Cricotopus bicinctus	7	9.9	I	I
Tanytarsus sp.	7	9.9	II	F,I
Stictochironomus sp.	8	11.3	I	F,I
Cricotopus sp.	2	2.8	I	I
Polypedilum halterale	11	15.5	I	F,I

Total Collected	71	Diversity	2.60
Number of Taxa	10	Equitibility	0.83

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	4	2	2	--	2
Percent	40.0	20.0	20.0	--	20.0

Beck's Biotic Index = 10

APPENDIX C-2

Taxa, Beck's Biotic Index and Pollution Tolerance Classification of Benthic Organisms Collected in Fall 1977 Sampling from Artificial Substrates (Hester-Dendy's) in the Study Area

Station: SC-2
Replicate: 1
Location: At bridge on river road. Shaded area in Southern mixed hardwoods.
Date of Collection: December 1, 1977

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Odonata				
Agria sp.	1	1.4	I	I
Trichoptera				
Cyrnellus sp.	1	1.4	V	F
Hydropsyche simulans	1	1.4	I	I
Cheumatopsyche sp.	3	4.2	II	F
Diptera				
Polypedilum illinoense	49	6.8	II	F,I
Chironomus attenuatus	7	9.7	III	T,I
Tanytarsus sp.	10	13.9	II	F,I

Total Collected: 72
Number of Taxa: 7

Diversity: 1.55
Equitibility: 0.53

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	2	3	1	--	1
Percent	28.6	42.9	14.3	--	14.3

Beck's Biotic Index = 7

Station: SC-2
Replicate: 2

Location: At bridge on River road. Shaded area in Southern mixed hardwoods.
Date of Collection: December 1, 1977

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Trichoptera				
Hydropsyche sp.	1	2.2	I	I
Diptera				
Labrundinia sp.	1	2.2	I	I
Tanytarsus sp.	8	17.4	II	F,I
Polypedilum illinoense	31	67.4	II	F,I
Dicrotendipes sp.	5	10.9	II	F,I

Total Collected: 46
Number of Taxa: 5

Diversity: 1.41
Equitibility: 0.66

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	2	3	--	--	--
Percent	40.0	60.0	--	--	--

Beck's Biotic Index = 7

Station: SC-2
Replicate: 3

Location: At bridge on River road. Shaded area in Southern mixed hardwoods.
Date of Collection: December 1, 1977

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Oligochaeta	1	3.2	III	T,F
Odonata				
Agria sp.	1	3.2	I	I
Trichoptera				
Cheumatopsyche sp.	7	22.6	II	F
Diptera				
Polypedilum *illionoense*	10	32.6	II	F,I
Tribelos sp.	2	6.4	I	I
Tanytarsus sp.	5	16.1	II	F,I
Ablabesmyia aspera	3	9.7	I	I
Metriocnemus sp.	2	6.4	V	

Total Collected: 31
Number of Taxa: 8

Diversity: 2.59
Equitibility: 1.04

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	3	3	1	--	1
Percent	37.5	37.5	12.5	--	12.5

Beck's Biotic Index = 9

Station:	SC-2	Location:	At bridge on River road. Shaded area in Southern mixed hardwoods.
Replicate:	4	Date of Collection:	December 1, 1977

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Trichoptera				
Hydropsyche sp.	32	31.4	I	I
Cheumatopsyche sp.	8	7.8	II	F
Neureclipsis sp.	1	1.0	V	I
Diptera				
Polypedilum illinoense	28	27.4	II	F,I
Tribelos sp.	7	6.7	I	I
Strictochironomus sp.	14	13.7	I	I
Rheotanytarsus sp.	3	2.9	II	F,I
Conchapelopia sp.	3	2.9	V	F
Tanytarsus sp.	3	2.9	II	F,I
Labrundinia sp.	2	2.0	V	I

Total Collected: 102
Number of Taxa: 10

Diversity: 2.62
Equitibility: 0.85

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	3	4	--	--	3
Percent	30.0	40.0	--	--	30.0

Beck's Biotic Index = 10

Station: SC-4A
Replicate: 1
Location: At U.S. 41 bridge. Sunlit riffle area.
Date of Collection: December 1, 1977

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Ephemeroptera				
Caenis diminuta	1	0.3	III	T
Trichoptera				
Hydropsyche simulans	1	0.3	I	I
Cheumatopsyche sp.	120	33.4	II	F
Megaloptera				
Corydalus cornutus	2	0.6	I	F,I
Diptera				
Simulium sp.	4	1.1	I	I
Polypedilum illinoense	120	33.4	II	F,I
Clinotanypus pinguis	24	6.7	II	F,I
Tribelos sp.	15	4.2	I	I
Rheotanytarsus sp.	52	14.4	II	F,I
Tanytarsus sp.	20	5.6	II	F,I

Total Collected: 359
Number of Taxa: 10
Diversity: 2.31
Equitibility: 0.67

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	4	5	1	--	--
Percent	40.0	50.0	10.0	--	--

Beck's Biotic Index = 13

Station: SC-4A
Replicate: 2

Location: At U.S. 41 bridge. Sunlit riffle area.
Date of Collection: December 1, 1977

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Ephemeroptera				
Caenis diminuta	4	0.9	III	T
Odonata				
Enallagma sp.	2	0.4	II	F,I
Trichoptera				
Cheumatopsyche sp.	196	44.2	II	F
Diptera				
Simulium sp.	1	0.2	I	I
Concchapelopia sp.	8	1.8	V	F
Rheotanytarsus sp.	36	8.1	II	F,I
Polypedilum illinoense	184	41.5	II	F,I
Tanytarsus sp.	12	2.7	II	F,I

Total Collected: 443
Number of Taxa: 8

Diversity: 1.70
Equitibility: 0.53

Beck's Biotic Class

Classification	I	II	III	IV	V
Number of Taxa	1	5	1	--	1
Percent	12.5	62.5	12.5	--	12.5

Beck's Biotic Index = 7

Station: SC-4A Location: At U.S. 41 bridge. Sunlight riffle
Replicate: 3 area.

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Odonata				
Agria sp.	1	0.6	I	I
Trichoptera				
Cheumatopsyche sp.	68	43.9	II	F
Megaloptera				
Corydalus cornutus	1	0.6	I	F,I
Coleoptera				
Ancyronyx variegatus	1	0.6	V	I
Diptera				
Chaoborus sp.	1	0.6	V	F,I
Conchapelopia sp.	3	1.9	V	F
Tanytarsus sp.	8	5.2	II	F,I
Polypedilum illinoense	72	46.4	II	F,I

Total Collected: 155
Number of Taxa: 8

Diversity: 1.55
Equitibility: 0.46

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	2	3	--	--	3
Percent	25.0	37.5	--	--	37.5

Beck's Biotic Index = 7

Station: SC-4A Location: At U.S. 41 bridge. Sunlit riffle area.
Replicate: 4
Date of Collection: December 1, 1977

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Oligochaeta	1	1.0	III	T,F
Trichoptera				
Cheumatopsyche sp.	22	22.7	II	F
Megaloptera				
Corydalus cornutas	1	1.0	I	F,I
Diptera				
Simulium sp.	1	1.0	I	I
Polypedilum illinoense	53	54.6	II	F,I
Rheotanytarsus sp.	13	13.4	II	F,I
Tanytarsus sp.	6	6.2	II	F,I

Total Collected: 97
Number of Taxa: 7

Diversity: 1.80
Equitibility: 0.64

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	2	4	1	--	--
Percent	28.6	57.1	14.3	--	--

Beck's Biotic Index = 8

Station: SC-4B
Replicate: 1
Location: At U.S. 41 bridge. Shaded area in Southern mixed hardwoods.
Date of Collection: December 1, 1977

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Odonata				
Enallagma sp.	1	1.1	II	F,I
Trichoptera				
Cheumatopsyche sp.	34	38.2	II	F
Neureclipsis sp.	1	1.1	V	I
Megaloptera				
Corydalus cornutus	2	2.2	I	F,I
Diptera				
Polypedilum illinoense	18	20.2	II	F,I
Chironomus carus	3	3.4	III	T
Tanytarsus sp.	4	4.5	II	F,I
Rheotanytarsus sp.	9	10.1	II	F,I
Tribelos sp.	10	11.2	I	I
Conchapelopia sp.	1	1.1	V	F
Chironomus attenuatus	6	6.7	III	T,I

Total Collected: 89
Number of Taxa: 11
Diversity: 2.65
Equitibility: 0.79

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	2	5	2	--	2
Percent	18.2	45.4	18.2	--	18.2

Beck's Biotic Index = 9

Station: SC-4B   Location: At U.S. 41 bridge. Shaded area
Replicate: 2   in Southern mixed hardwoods.
Date of Collection: December 1, 1977

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Oligochaeta	1	1.2	III	T,F
Trichoptera				
Cheumatopsyche sp.	19	22.6	II	F
Neureclipsis sp.	1	1.2	V	I
Diptera				
Conchapelopia sp.	1	1.2	V	F
Polypedilum illinoense	35	41.7	II	F,I
Chironomus attenuatus	3	3.6	III	T,I
Micropsectra sp.	14	16.7	V	F,I
Ablabesmyia sp.	3	3.6	I	I
Rheotanytarsus sp.	7	8.3	II	F,I

Total Collected: 84   Diversity: 2.31
Number of Taxa: 9   Equitibility: 0.74

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	1	3	2	--	3
Percent	11.1	33.3	22.2	--	33.3

Beck's Biotic Index = 5

Station: SC-4B
Replicate: 3

Location: At U.S. 41 bridge. Shaded area in Southern mixed hardwoods.
Date of Collection: December 1, 1977

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Oligochaeta	2	3.0	III	T,F
Trichoptera				
Cheumatopsyche sp.	14	20.9	II	F
Megaloptera				
Corydalus cornutus	1	1.5	I	F,I
Diptera				
Polypedilum illinoense	30	44.8	II	F,I
Chironomus attenuatus	11	16.4	III	T,I
Chironomus carus	6	9.0	III	T
Metriocnemus sp.	1	1.5	V	
Thienemanniella sp.	2	3.0	I	I

Total Collected: 67
Number of Taxa: 8

Diversity: 2.21
Equitibility: 0.78

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	2	2	3	--	1
Percent	25.0	25.0	37.5	--	12.5

Beck's Biotic Index = 6

Station: SC-4B
Replicate: 4

Location: At US-41 bridge. Shaded area in Southern mixed hardwoods.
Date of Collection: December 1, 1977

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Ephemeroptera				
Caenis diminuta	2	1.0	III	T
Trichoptera				
Hydropsyche sp.	1	0.5	I	I
Cheumatopsyche sp.	81	39.9	II	F
Diptera				
Polypedilum illinoense	70	34.5	II	F,I
Tribelos sp.	14	6.9	I	I
Conchapelopia sp.	1	0.5	V	F
Rheotanytarsus sp.	3	1.5	II	F,I
Tanytarsus sp.	10	4.9	II	F,I
Clinotanypus pinguis	2	1.0	II	F,I
Chironomus carus	16	7.9	III	T
Labrundinia sp.	1	0.5	I	I
Mollusca				
Physa sp.	2		III	T

Total Collected: 202
Number of Taxa: 12

Diversity: 2.23
Equitibility 0.52

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	3	5	3	-	1
Percent	25.0	41.7	25.0	-	8.3

Beck's Biotic Index = 11

Station: SC-6 Location: Approximately one mile upstream
Replicate: 1 from SC-4. Shaded area in Southern
mixed hardwoods with hyacinth mat.
Date of Collection: December 1, 1977

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Oligochaeta	93	58.5	III	T,F
Turbellaria	2	1.2	V	F
Ephemeroptera				
Caenis diminuta	8	5.0	III	T
Diptera				
Psectrocladius sp.	22	13.8	I	I
Chironomus attenuatus	27	17.0	III	T,I
Ablabesmyia sp.	2	1.2	I	I
Eukiefferiella sp.	1	0.6	I	
Polypedilum illinoense	1	0.6	II	F,I
Tanytarsus sp.	2	1.2	II	F,I
Dicrotendipes sp.	1	0.6	II	F,I

Total Collected: 159
Number of Taxa: 10
Diversity: 1.87
Equitibility: 0.48

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	3	3	3	-	1
Percent	30.0	30.0	30.0	-	10.0

Beck's Biotic Index = 9

Station:	SC-6	Location:	Approximately one mile upstream from SC-4. Shaded area in Southern mixed hardwood swamp with hyacinth mat.
Replicate:	2	Date of Collection:	December 1, 1977

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Oligochaeta	16	20.2	III	T,F
Hirudinea				
Helobdella stagnalis	1	1.3	III	T
Turbellaria	4	5.1	V	F
Ephemeroptera				
Caenis climinuta	7	8.9	III	T
Odonata				
Agria sp.	1	1.3	I	I
Enallagma sp.	1	1.3	II	F,I
Trichoptera				
Cynellus sp.	2	2.5	V	F
Coleoptera				
Dytiscidae sp.	1	1.3	V	T
Diptera				
Dicrotendipes sp.	3	3.8	II	F,I
Psectrocladius sp.	12	15.2	I	I
Tanytarsus sp.	4	5.1	II	F,I
Rheotanytarsus sp.	3	3.8	II	F,I
Chironomus carus	24	30.4	III	T

Total Collected:	79	Diversity:	2.96
Number of Taxa:	13	Equitibility:	0.84

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	2	4	4	-	3
Percent	15.4	30.8	30.8	-	23.1

Beck's Biotic Index = 8

Station: SC-6 Location: Approximately one mile upstream from
Replicate: 3 from SC-4. Shaded area in mixed
hardwood swamp with hyacinth mat.
Date of Collection: December 1, 1977

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Oligochaeta	18	20.2	III	T,F
Turbellaria	1	1.1	V	F
Ephemeroptera				
Caenis diminuta	5	5.6	III	T
Odonata				
Agria sp.	2	2.2	I	I
Trichoptera				
Cyrnellus sp.	2	2.2	V	F,I
Diptera				
Psectrocladius sp.	21	23.6	I	I
Polypedilum illinoense	6	6.7	II	F,I
Tanytarsus sp.	14	15.7	II	F,I
Chironomus carus	20	22.5	III	T

Total Collected: 89
Number of Taxa: 9

Diversity: 2.68
Equitibility: 0.99

Beck's Biotic Class	I	II	III	IV	V
Classification	I	II	III	IV	V
Number of Taxa	2	2	3	--	2
Percent	22.2	22.2	33.3	--	22.2

Beck's Biotic Index = 6

Station: SC-6
Replicate: 4

Location: Approximately one mile upstream from SC-4. Shaded area in mixed hardwood swamp with hyacinth mat.
Date of Collection: December 1, 1977

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Oligochaeta	18	20.9	III	T,F
Turbellaria	1	1.2	V	F
Ephemeroptera				
Caenis diminuta	3	3.5	III	T
Odonata				
Enallagona sp.	1	1.2	II	F,I
Trichoptera				
Cheumatopsyche sp.	1	1.2	II	F
Coleoptera				
Dytiscidae sp.	1	1.2	V	T
Diptera				
Simulium sp.	1	1.2	I	I
Polypedilum illinoense	10	11.6	II	F,I
Chironomus carus	24	27.9	III	T
Dicrotendipes sp.	14	16.3	II	F,I
Psectrocladius sp.	7	8.1	I	I
Ablabesmyia sp.	2	2.3	I	I
Rheotanytarsus sp.	3	3.5	II	F,I

Total Collected: 86
Number of Taxa: 13

Diversity: 2.91
Equitibility: 0.81

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	3	5	3	--	2
Percent	23.1	38.5	23.1	--	15.4

Beck's Biotic Index = 11

Station: SC-7
Replicate: 1

Location: At railroad trestle on Occidental property. Channelized with hyacinth mat.
Date of Collection: December 1, 1977

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Oligochaeta	3	3.0	III	T,F
Trichoptera				
Neureclipsis sp.	9	9.1	V	I
Cheumatopsyche sp.	3	3.0	II	F
Hydropsyche sp.	1	1.0	I	I
Diptera				
Psectrocladius sp.	7	7.1	I	I
Chironomus attenuatus	19	19.2	III	T,I
Chironomus carus	57	57.6	III	T

Total Collected: 99
Number of Taxa: 7

Diversity: 1.87
Equitibility: 0.67

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	2	1	3	--	1
Percent	28.6	14.3	42.9	--	14.3

Beck's Biotic Index = 5

Station: SC-7
Replicate: 2

Location: At railroad trestle on Occidental property. Channelized with hyacinth mat.
Date of Collection: December 1, 1977

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Oligochaeta	2	3.3	III	T,F
Trichoptera				
Cyrnellus sp.	3	4.9	V	F
Cheumatopsyche sp.	3	4.9	II	F
Diptera				
Simulium sp.	1	1.6	I	I
Chironomus carus	46	75.4	III	T
Psectrocladius sp.	5	8.2	I	I
Glyptotendipes sp.	1	1.6	III	T

Total Collected: 61
Number of Taxa: 7

Diversity: 1.39
Equitability: 0.47

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	2	1	3	--	1
Percent	28.6	14.3	42.9	--	14.3

Beck's Biotic Index = 5

Station: SC-7
Replicate: 3

Location: At railroad trestle on Occidental property. Channelized with hyacinth mat.

Date of Collection: December 1, 1977

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Oligochaeta	7	10.4	III	T,F
Trichoptera				
Cyrnellus sp.	9	13.4	V	F
Cheumatopsyche sp.	3	4.5	II	F
Diptera				
Psychoda sp.	1	1.5	IV	T
Chironomus attenuatus	26	38.9	III	T,I
Cricotopus sp.	1	1.5	I	I
Psectrocladius sp.	6	9.0	I	I
Chironomus carus	13	19.4	III	T
Tanytarsus sp.	1	1.5	II	F,I

Total Collected: 67
Number of Taxa: 9

Diversity: 2.50
Equitibility: 0.86

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	2	2	3	1	1
Percent	22.2	22.2	33.3	11.1	11.1

Beck's Biotic Index = 6

Station: SC-7
Replicate: 4

Location: At railroad trestle on Occidental property. Channelized with hyacinth mat.
Date of Collection: December 1, 1977

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Oligochaeta	3	3.9	III	T,F
Turbellaria	1	1.3	V	F
Odonata				
Enallagma sp.	2	2.6	II	F,I
Trichoptera				
Cyrnellus sp.	2	2.6	V	F
Cheumatopsyche sp.	5	6.6	II	F
Diptera				
Polypedilum illinoense	1	1.3	II	F,I
Cricotopus sp.	1	1.3	I	I
Psectrocladius sp.	2	2.6	I	I
Tribelos sp.	1	1.3	I	I
Chironomus attenuatus	50	65.8	III	T,I
Chironomus carus	8	10.5	III	T

Total Collected: 76
Number of Taxa: 11

Diversity: 1.92
Equitibility: 0.45

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	3	3	3	--	2
Percent	27.3	27.3	27.3	--	18.2

Beck's Biotic Index = 9

Station: SC-8 Location: Culvert at SR 137. Channelized
Replicate: 1 portion. Sunlit area.
Date of Collection: December 1, 1977

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Oligochaeta	15	4.0	III	T,F
Odonata				
Enallagma sp.	2	0.5	II	F,I
Diptera				
Psectrocladius sp.	1	0.3	I	I
Chironomus attenuatus	213	57.1	III	T,I
Chironomus carus	142	38.1	III	T

Total Collected: 373
Number of Taxa: 5
Diversity: 1.24
Equitability: 0.56

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	1	1	3	--	--
Percent	20.0	20.0	60.0	--	--

Beck's Biotic Index = 3

Station: SC-8 Location: Culvert at SR 137. Channelized
Replicate: 2 portion. Sunlit area.
Date of Collection: December 1, 1977

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Oligochaeta	6	2.6	III	T,F
Odonata				
Enallagma sp.	1	0.4	II	F,I
Diptera				
Chironomus carus	175	76.4	III	T
Chironomus attenuatus	45	19.7	III	T,I
Rheotanytarsus sp.	1	0.4	II	F,I
Polypedilum illinoense	1	0.4	II	F,I

Total Collected: 229
Number of Taxa: 6
Diversity: 1.00
Equitibility: 0.40

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	--	3	3	--	--
Percent	--	50.0	50.0	--	--

Beck's Biotic Index = 3

Station: SC-8
Replicate: 3

Location: Culvert at SR 137. Channelized portion. Sunlit area.
Date of Collection: December 1, 1977

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Oligochaeta	8	2.7	III	T,F
Odonata				
Enallegma sp.	2	0.7	II	F,I
Diptera				
Chironomus attenuatus	177	60.4	III	T,I
Chironomus carus	106	36.2	III	T

Total Collected: 293
Number of Taxa: 4

Diversity: 1.16
Equitability: 0.68

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	--	1	3	--	--
Percent	--	25.0	75.0	--	--

Beck's Biotic Index = 1

Station: SC-8 Location: Culvert at SR 137. Channelized portion.
Replicate: 4 Sunlit area.
Date of Collection: December 1, 1977

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Oligochaeta	21	6.6	III	T,F
Odonata				
Enallagma sp.	4	1.3	II	F,I
Diptera				
Psychoda sp.	1	0.3	IV	T
Chironomus attenuatus	174	55.1	III	T,I
Chironomus carus	116	36.7	III	T

Total Collected: 316 Diversity: 1.37
Number of Taxa: 5 Equitability: 0.64

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	--	1	3	1	--
Percent	--	20.0	60.0	20.0	--

Beck's Biotic Index = 1

Station: SC-9 Location: At bridge on Occidental property.
Replicate: 1 Channelized shaded by brush.
Date of Collection: December 1, 1977

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Ephemeroptera				
Stenonema smithae	2	8.0	I	I
Trichoptera				
Cheumatopsyche sp.	18	72.0	II	F
Cyrnellus sp.	2	8.0	V	F
Odonata				
Agria sp.	2	8.0	I	I
Coleoptera				
Dytiscidae sp.	1	4.0	V	T

Total Collected: 25
Number of Taxa: 5
Diversity: 1.40
Equitibility: 0.55

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	2	1	--	--	2
Percent	40.0	20.0	--	--	40.0

Beck's Biotic Index = 5

Station: SC-9
Replicate: 2
Location: At bridge on Occidental property. Channelized, shaded by brush.
Date of Collection: December 1, 1977

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Trichoptera				
Cyrnellus sp.	1	5.9	V	F
Cheumatopsyche sp.	9	52.9	II	F
Neureclipsis sp.	2	11.8	V	I
Megaloptera				
Corydalus cornutus	1	5.9	I	F,I
Odonata				
Agria sp.	1	5.9	I	I
Diptera				
Polypedilum illinoense	2	11.8	II	F,I
Rheotanytarsus sp.	1	5.9	II	F,I

Total Collected: 17
Number of Taxa: 7
Diversity: 2.17
Equitibility: 0.86

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	2	3	--	--	2
Percent	28.6	42.9	--	--	28.6

Beck's Biotic Index = 7

Station: SC-9 Location: At bridge on Occidental property.
Replicate: 3 Channelized, shaded by brush.

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Odonata				
Agria sp.	1	1.9	I	I
Trichoptera				
Cyrnellus sp.	2	3.7	V	F
Cheumatopsyche sp.	41	75.9	II	F
Megaloptera				
Corydalus cornutus	1	1.9	I	F,I
Coleoptera				
Dubiraphia sp.	1	1.9	II	F
Diptera				
Chironomus attenuatus	2	3.7	III	T,I
Tanytarsus sp.	1	1.9	II	F,I
Polypedilum illinoense	3	5.6	II	F,I
Chironomus carus	1	1.9	III	T
Conchapelopia	1	1.9	V	F

Total Collected: 54
Number of Taxa: 10

Diversity: 1.52
Equitibility: 0.36

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	2	4	2	--	2
Percent	20.0	40.0	20.0	--	20.0

Beck's Biotic Index = 8

Station: SC-9
Replicate: 4

Location: At bridge on Occidental property, channelized shaded by brush.
Date of Collection: December 1, 1977

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Ephemeroptera				
Caenis diminuta	1	7.7	III	T
Trichoptera				
Cyrnellus sp.	1	7.7	V	F
Diptera				
Chironomus attenuatus	2	15.4	III	T,I
Chironomus carus	5	38.5	III	T
Tanytarsus sp.	3	23.1	II	F,I
Mollusca				
Physa sp.	1	7.7	III	T

Total Collected: 13
Number of Taxa: 6

Diversity: 2.29
Equitibility: 1.10

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	-	1	4	-	1
Percent	-	16.7	66.6	-	16.7

Beck's Biotic Index = 1

Station: CB-1
Replicate: 1

Location: Approximately 2.3 miles downstream from CB-3 at sink. Shaded area in Southern mixed hardwoods.
Date of Collection: December 1, 1977

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Trichoptera				
Cheumatopsyche sp.	1	25.0	II	F
Diptera				
Tanytarsus sp.	1	25.0	II	F,I
Cricotopus sp.	1	25.0	I	I
Chironomus attenuatus	1	25.0	III	T,I

Total Collected: 4
Number of Taxa 4

Diversity: 2.00
Equitibility: 1.3

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	1	2	1	-	-
Percent	25.0	50.0	25.0	-	-

Beck's Biotic Index = 4

Station: CB-1 Location: Approximately 2.3 miles downstream
Replicate: 2 from CB-3 at sink. Shaded area
in Southern mixed hardwoods.
Date of Collection: December 1, 1977

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Ephemeroptera				
Baetis sp.	2	13.3	V	
Stenonema smithae	5	33.3	I	I
Trichoptera				
Cheumatopsyche sp.	2	13.3	II	F
Diptera				
Tipula	1	6.7	IV	I
Polypedilum fallox	3	20.0	I	F,I
Cricotopus sp.	2	13.3	I	I

Total Collected: 15
Number of Taxa: 6

Diversity: 2.42
Equitibility 1.2

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	3	1	-	1	1
Percent	50.0	16.7	-	16.7	16.7

Beck's Biotic Index = 7

Station: CB-1
Replicate: 3

Location: Approximately 2.3 miles downstream from CB-3 at sink. Shaded area in Southern mixed hardwoods.

Date of Collection: December 1, 1977

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Ephemeroptera				
Stenonema smithae	2	6.9	I	I
Diptera				
Simulium sp.	1	3.4	I	I
Tanytarsus sp.	1	3.4	II	F,I
Rheotanytarsus sp.	1	3.4	II	F,I
Stictochironomus sp.	12	41.4	I	I
Polypedilum illinoense	8	27.6	II	F,I
Chironomus attenuatus	4	13.8	III	T,I

Total Collected: 29
Number of Taxa: 7

Diversity: 2.20
Equitibility: 0.87

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	3	3	1	-	-
Percent	42.9	42.9	14.3	-	-

Beck's Biotic Index = 9

Station: CB-1
Replicate: 4

Location: Approximately 2.3 miles downstream from CB-3 at sink. Shaded area in Southern mixed hardwoods.
Date of Collection: December 1, 1977

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Turbellaria	2	15.4	V	F
Ephemeroptera				
Baetis sp.	1	7.7	V	
Trichoptera				
Cheumatopsyche sp.	2	15.4	II	F
Diptera				
Tipulidae sp.	2	15.4	IV	F
Simulium sp.	1	7.7	I	I
Cricotopus sp.	2	15.4	I	I
Polypedilum illinoense	3	23.1	II	F,I

Total Collected: 13
Number of Taxa: 7

Diversity: 2.72
Equitibility: 1.3

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	2	2	-	1	2
Percent	28.6	28.6	-	14.3	28.6

Beck's Biotic Index = 6

Station: CB-2
Replicate: 1

Location: Approximately 1.7 miles downstream from CB-3 at bridge on county road. Shaded area in Southern mixed hardwoods.

Date of Collection: December 1, 1977

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Ephemeroptera				
Stenonema smithae	2	9.1	I	I
Diptera				
Polypedilum fallox	7	31.8	I	F,I
Dicrotendipes sp.	4	18.2	II	F,I
Stictochironomus sp.	3	13.6	I	I
Polypedilum illinoense	4	18.2	II	F,I
Tanytarsus	2	9.1	II	F,I

Total Collected: 22
Number of Taxa: 6

Diversity: 2.44
Equitibility: 1.23

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	3	3	-	-	-
Percent	50.0	50.0	-	-	-

Beck's Biotic Index = 9

Station: CB-2
Replicate: 2

Location: Approximately 1.7 miles downstream from CB-3 at bridge on county road. Shaded area in Southern mixed hardwoods.

Date of Collection: December 1, 1977

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Ephemeroptera				
Stenonema smithae	1	8.3	I	I
Coleoptera				
Dytiscidae sp.	1	8.3	V	T
Diptera				
Polypedilum fallox	2	16.7	I	F,I
Stictochironomus sp.	6	50.0	I	I
Micropsectra sp.	2	16.7	V	F,I

Total Collected: 12
Number of Taxa: 5

Diversity: 1.96
Equitibility: 1.02

Classification	I	II	III	IV	V
	Beck's Biotic Class				
Number of Taxa	3	-	-	-	2
Percent	60.0	-	-	-	40.0

Beck's Biotic Index = 6

Station: CB-2
Replicate: 3

Location: Approximately 1.7 miles downstream from CB-3 at bridge on county road. Shaded area in Southern mixed hardwoods.

Date of Collection: December 1, 1977

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Diptera				
Chironomus sp.	2	12.5	III	T,F
Stictochironomus sp.	6	37.5	I	I
Tanytarsus sp.	1	6.2	II	F,I
Dicrotendipes sp.	3	18.8	II	F,I
Chironomus attenuatus	2	12.5	III	T,I
Psectrocladius sp.	2	12.5	I	I

Total Collected: 16
Number of Taxa: 6

Diversity: 2.36
Equitibility: 1.17

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	2	2	2	-	-
Percent	33.3	33.3	33.3	-	-

Beck's Biotic Index = 6

Station: CB-3
Replicate: 1
Location: At SR-132 bridge. Shaded area in Southern mixed hardwoods.
Date of Collection: December 1, 1977

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Isopoda				
Asellus sp.	1	11.1	I	T,F,I
Ephemeroptera				
Leptophlebia intermedius	4	44.4	V	
Diptera				
Ablabesmyia aspera	2	22.2	I	I
Micropsectra sp.	1	11.1	V	F,I
Thienemanniella sp.	1	11.1	I	I

Total Collected: 9
Number of Taxa: 5
Diversity: 2.06
Equitibility: 1.10

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	3	-	-	-	2
Percent	60.0	-	-	-	20.0

Beck's Biotic Index = 6

Station: CB-3 Location: At SR-132 bridge. Shaded area in
Replicate: 2 Southern mixed hardwoods.
Date of Collection: December 1, 1977

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Ephemeroptera				
Leptophlebia intermedius	2	25.0	V	
Diptera				
Tribelos sp.	1	12.5	I	I
Dicrotendipes sp.	1	12.5	II	F,I
Ablabesmyia aspera	1	12.5	I	I
Polypedilum fallox	1	12.5	I	F,I
Chironomus attenuatus	2	25.0	III	T,I

Total Collected: 8
Number of Taxa: 6

Diversity: 2.50
Equitibility: 1.28

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	3	1	1	-	1
Percent	50.0	16.7	16.7	-	16.7

Beck's Biotic Index = 7

Station: CB-3
Replicate: 3

Location: At SR-132 bridge. Shaded area in Southern mixed hardwoods.
Date of Collection: December 1, 1977

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Ephemeroptera				
Leptophlebia intermedius	3	27.3	V	F,I
Diptera				
Polypedilum fallox	4	36.4	I	F,I
Ablabesmyia aspera	1	9.1	I	I
Dicrotendipes sp.	1	9.1	II	F,I
Chironomus attenuatus	2	18.2	III	T,I

Total Collected: 11
Number of Taxa: 5

Diversity: 2.12
Equibility: 1.16

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	2	1	1	-	1
Percent	40.0	20.0	20.0	-	20.0

Beck's Biotic Index = 5

Station: RC-2
Replicate: 1

Location: 1.5 miles upstream from confluence with Suwannee River upstream from permanent USGS guaging station. Shaded area in Southern mixed hardwoods.

Date of Collection: December 1, 1977

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Ephemeroptera				
Stenonema smithae	4	66.6	I	I
Odonata				
Agria sp.	1	16.7	I	I
Trichoptera				
Neuroclipsis sp.	1	16.7	V	I

Total Collected: 6
Number of Taxa: 3

Diversity: 1.25
Equitibility: 0.97

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	2	--	--	--	1
Percent	66.7	--	--	--	33.3

Beck's Biotic Index = 4

Station: RC-2
Replicate: 2

Location: 1.5 miles upstream from confluence with Suwannee River upstream from permanent USGS guaging station. Shaded area in Southern mixed hardwoods.

Date of Collection: December 1, 1977

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Oligochaeta	7	33.3	III	T,F
Amphipoda				
Hyalella azteca	1	4.8	II	F
Ephemeroptera				
Stenonema smithae	2	9.5	I	I
Odonata				
Agria sp.	1	4.8	I	I
Trichoptera				
Neureclipsis sp.	1	4.8	V	I
Diptera				
Polypedilum illinoense	1	4.8	II	F,I
Psectrocladius sp.	3	14.3	I	I
Stictochironomus sp.	2	9.5	I	I
Dicrotendipes sp.	2	9.5	II	F,I
Chironomus attenuatus	1	4.8	III	T,I

Total Collected: 21
Number of Taxa: 10

Diversity: 2.94
Equitibility: 1.08

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	4	3	2	--	1
Percent	40.0	30.0	20.0	--	10.0

Beck's Biotic Index = 11

Station: RC-2
Replicate: 3

Location: 1.5 miles upstream from confluence with Suwannee River upstream from permanent USGS guaging station. Shaded area in Southern mixed hardwoods.

Date of Collection: December 1, 1977

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Ephermeroptera				
Stenonema smithae	8	80.0	I	I
Odonata				
Agria sp.	1	10.0	I	I
Trichoptera				
Neureclipsis sp.	1	10.0	V	I

Total Collected: 10
Number of Taxa: 3

Diversity: 0.92
Equitibility: 0.73

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	2	--	--	--	1
Percent	66.7	--	--	--	33.3

Beck's Biotic Index = 4

Station: HC-1
Replicate: 1

Location: At bridge on SR 135. Shaded area in Southern mixed hardwoods.
Date of Collection: December 1, 1977

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Oligochaeta	1	2.1	III	T,F
Ephemeroptera				
Baetis sp.	2	4.2	V	
Trichoptera				
Cheumatopsyche sp.	1	2.1	II	F
Coleoptera				
Stenelmis sp.	2	4.2	II	F,I
Diptera				
Tribelos sp.	3	6.4	I	I
Polypedilum fallox	10	21.3	I	F,I
Thienemanniella sp.	6	12.8	I	I
Tanytarsus sp.	19	40.4	II	F,I
Conchapelopia sp.	3	6.4	V	F

Total Collected: 47
Number of Taxa: 9

Diversity: 2.51
Equitibility: 0.87

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	3	3	1	--	2
Percent	33.3	33.3	11.1	--	22.2

Beck's Biotic Index = 9

Station: HC-1 Location: At bridge on SR 135. Shaded area
Replicate: 2 in Southern mixed hardwoods.
Date of Collection: December 1, 1977

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Ephemeroptera				
Baetis sp.	1	2.7	V	
Odonata				
Agria sp.	1	2.7	I	I
Trichoptera				
Cheumatopsyche sp.	2	5.4	II	F
Diptera				
Thienemanniella sp.	4	10.8	I	I
Tanytarsus sp.	16	43.2	II	F,I
Conchapelopia sp.	2	5.4	V	F
Cricotopus sp.	7	18.9	I	I
Polypedilum fallox	4	10.8	I	F,I

Total Collected: 37
Number of Taxa: 8

Diveristy: 2.41
Equitibility: 0.90

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	4	2	--	--	2
Percent	50.0	25.0	--	--	25.0

Beck's Biotic Index = 10

Station: HC-1
Replicate: 3

Location: At bridge on SR 135. Shaded area in Southern mixed hardwoods.
Date of Collection: December 1, 1977

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Ephemeroptera				
Baetis sp.	1	3.6	V	
Trichoptera				
Cheumatopsyche sp.	1	3.6	II	F
Diptera				
Thienemanniella sp.	4	14.3	I	I
Ablabesmyia aspera	1	3.6	I	I
Polypedilum *fallox*	6	21.4	I	F,I
Tanytarsus sp.	13	46.4	II	F,I
Polypedilum *illinoense*	2	7.1	II	F,I

Total Collected: 28
Number of Taxa: 7

Diversity: 2.18
Equitibility: 0.86

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	3	3	--	--	1
Percent	42.9	42.9	--	--	14.2

Beck's Biotic Index = 9

Station: HC-1 Location: At bridge on SR 135. Shaded area
Replicate: 4 in Southern mixed hardwoods.
Date of Collection: December 1, 1977

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Trichoptera				
Cheumatopsyche sp.	1	1.8	II	F
Coleoptera				
Stenelmis sp.	1	1.8	II	F,I
Diptera				
Polypedilum _fallox_	8	14.5	I	F,I
Metriocnemus sp.	3	5.4	V	
Ablabesmyia _peelensis_	2	3.6	II	T
Cricotopus sp.	6	10.9	I	I
Psectrocladius sp.	1	1.8	I	I
Tanytarsus sp.	20	36.4	II	F,I
Micropsectra sp.	10	18.2	V	F,I
Thienemanniella sp.	3	5.4	I	I

Total Collected: 55
Number of Taxa: 10

Diversity: 2.68
Equitibility: 0.89

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	4	4	--	--	2
Percent	40.0	40.0	--	--	20.0

Beck's Biotic Index = 12

Station: RO-2 Location: 1.8 miles upstream from confluence
Replicate: 1 with Suwannee River at SR 135 bridge. Shaded area in Southern mixed hardwoods.
Date of Collection: December 1, 1977

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Oligochaeta	8	10.7	III	T,F
Ephemeroptera				
Baetis sp.	1	1.3	V	
Odonata				
Agria sp.	1	1.3	I	I
Diptera				
Psychoda sp.	1	1.3	IV	T
Dicrotendipes sp.	29	38.7	II	F,I
Ablabesmyia peleensis	8	10.7	II	F
Tribelos sp.	4	5.3	I	I
Tanytarsus sp.	13	17.3	II	F,I
Micropsectra sp.	4	5.3	V	F,I
Mollusca				
Physa sp.	2	2.7	III	T
Ferrissia sp.	4	5.3	III	T,F

Total Collected:	75	Diversity:	2.72
Number of Taxa:	11	Equitibility:	0.83

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	2	3	3	1	2
Percent	18.2	27.3	27.3	9.1	18.2

Beck's Biotic Index = 11

Station: RO-2 Location: 1.8 miles upstream from confluence
Replicate: 2 with Suwannee River at SR 135 bridge.
Shaded area in Southern mixed hardwoods.
Date of Collection: December 1, 1977

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Oligochaeta	6	12.8	III	T,F
Trichoptera				
Oecetis sp.	1	2.1	II	F
Diptera				
Psychoda sp.	1	2.1	IV	T
Polypedilum illinoense	12	25.5	II	F,I
Dicrotendipes sp.	18	38.3	II	F,I
Ablabesmyia sp.	2	4.2	I	I
Tanytarsus sp.	6	2.1	III	T
Mollusca				
Physa sp.	1	2.1	III	T

Total Collected: 47
Number of Taxa: 8

Diversity: 2.34
Equitibility: 0.85

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	1	4	2	1	--
Percent	12.5	50.0	25.0	12.5	--

Beck's Biotic Index = 6

Station: RO-2
Replicate: 3
Location: 1.8 miles upstream from confluence with Suwannee River at SR 135 bridge. Shaded area in Southern mixed hardwoods.
Date of Collection: December 1, 1977

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Oligochaeta	19	24.4	III	T,F
Ephemeroptera				
Stenonema smithae	1	1.3	I	I
Paraleptophlebia bradlayi	1	1.3	V	
Odonata				
Agria sp.	1	1.3	I	I
Diptera				
Empididae sp.	1	1.3	V	F
Simulium sp.	1	1.3	I	I
Dicrotendipes sp.	26	33.3	II	F,I
Rheotanytarsus exiguus	1	1.3	I	T,I
Cladotanytarsus sp.	1	1.3	I	F
Micropsectra sp.	3	3.8	V	F,I
Polypedilum fallox	3	3.8	I	F,I
Tribelos sp.	6	7.7	I	I
Tanytarsus sp.	3	3.8	II	F,I
Ablabesmyia sp.	2	2.6	I	I
Polypedilum illinoense	3	3.8	II	F,I
Paratendipes sp.	6	7.7	V	I

Total Collected:	78	Diversity:	3.02
Number of Taxa:	16	Equitibility:	0.71

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	7	4	1	--	4
Percent	43.8	25.0	6.2	--	25.0

Beck's Biotic Index = 18

Station: RO-2
Replicate: 4

Location: 1.8 miles upstream from confluence with Suwannee River at SR 135 bridge. Shaded area in Southern mixed hardwoods.

Date of Collection: December 1, 1977

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Ephemeroptera				
Paraleptophlebia bradleyi	1	1.4	V	
Odonata				
Agria sp.	3	4.2	I	F
Diptera				
Dicrotendipes sp.	37	51.4	II	F,I
Tanytarsus sp.	16	22.2	II	F,I
Rheotanytarsus sp.	8	11.1	II	F
Ablabesmyia asperia	7	9.7	I	I

Total Collected: 72
Number of Taxa: 6

Diversity: 1.93
Equitibility: 0.83

Beck's Biotic Class

Classification	I	II	III	IV	V
Number of Taxa	2	3	--	--	1
Percent	33.3	50.0	--	--	16.7

Beck's Biotic Index = 7

Station: SR-7
Replicate: 1

Location: Upstream on Suwannee River from confluence with Swift Creek.
Date of Collection: December 1, 1977

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Ephemeroptera				
Stenonema smithae	19	25.7	I	I
Trichoptera				
Cheamatopsyche sp.	4	5.4	II	F
Diptera				
Simulium sp.	3	4.1	I	I
Eukiefferiella sp.	5	6.8	I	I
Polypedilum illinoense	35	47.3	II	F,I
Rheotanytarsus sp.	5	6.8	II	F,I
Cricotopus sp.	3	4.1	I	I

Total Collected: 74
Number of Taxa: 7

Diversity: 2.14
Equitibility: 0.72

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	4	3	--	--	--
Percent	57.1	42.9	--	--	--

Beck's Biotic Index = 11

Station: SR-8
Replicate: 1

Location: Downstream on Suwannee River from confluence with Swift Creek.
Date of Collection: December 1, 1977

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Diptera				
Simulium sp.	1	1.1	I	I
Polypedilum illinoense	60	68.2	II	F,I
Micropsectra sp.	7	8.0	V	F,I
Rheotanytarsus exiguus	7	8.0	I	I
Conchopelopia sp.	1	1.1	V	F
Chironomus attenuatus	12	13.6	III	T,I

Total Collected: 88
Number of Taxa: 6

Diversity: 1.50
Equitibility: 0.80

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	2	1	1	--	2
Percent	33.3	16.7	16.7	--	33.3

Beck's Biotic Index = 5

Station: SR-8
Replicate: 2
Location: Downstream on Suwannee River from confluence with Swift Creek.
Date of Collection: December 1, 1977

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Ephemeroptera				
Stenonema smithae	1	1.3	I	I
Trichoptera				
Hydropsyche simulans	4	5.3	I	I
Diptera				
Simulium sp.	3	3.9	I	I
Polypedilum illinoense	51	67.1	II	F,I
Conchopelopia sp.	2	2.6	V	F
Rheotanytarsus sp.	8	10.5	II	F,I
Micropsectra sp.	7	9.2	V	F,I

Total Collected: 76
Number of Taxa: 7
Diversity: 1.67
Equitibility: 0.58

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	3	2	--	--	2
Percent	42.9	28.6	--	--	28.6

Beck's Biotic Index = 8

Station: SR-8 Location: Downstream on Suwannee River from
Replicate: 3 confluence with Swift Creek.
Date of Collection: December 1, 1977

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Oligochaeta	1	1.2	III	T,F
Ephemeroptera				
Stenonema smithae	4	4.8	I	I
Trichoptera				
Hydropsyche frisoni	3	3.6	I	I
Hydropsyche sp.	12	14.4	I	I
Diptera				
Simulium sp.	2	2.4	I	I
Conchapelopia sp.	2	2.4	V	F
Polypedilum illinoense	40	48.2	II	F,I
Tanytarsus sp.	3	3.6	II	F,I
Eukiefferiella sp.	8	9.6	I	I
Rheotanytarsus sp.	8	9.6	II	F,I

Total Collected: 83
Number of Taxa: 10

Diversity: 2.45
Equitibility: 0.74

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	5	3	1	--	1
Percent	50.0	30.0	10.0	--	10.0

Beck's Biotic Index = 13

Station: SR-8 Location: Downstream on Suwannee River from confluence with Swift Creek.
Replicate: 4
Date of Collection: December 1, 1977

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Oligochaeta	1	1.6	III	T,F
Ephemerophera				
Stenonema smithae	1	1.6	I	I
Trichoptera				
Hydropsyche simulans	17	27.9	I	I
Diptera				
Simulium sp.	3	4.9	I	I
Eukiefferiella sp.	4	6.6	I	I
Polypedilum illinoense	22	36.1	II	F,I
Rheotanytarsus sp.	9	14.8	II	F,I
Conchapelopia sp.	4	6.6	V	F

Total Collected: 61 Diversity: 2.38
Number of Taxa: 8 Equitibility: 0.88

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	4	2	1	--	1
Percent	50.0	25.0	12.5	--	12.5

Beck's Biotic Index = 10

APPENDIX C-3

Taxa, Beck's Biotic Index and Pollution Tolerance Classifications of Benthic Organisms Collected in Winter 1978 from Natural Substrates in the Study Area

Station No: SC-2　Location: At bridge on River Road. Shaded area in
Replicate: 1　Southern mixed hardwoods.
Collection Date: February 16, 1978

Taxon	Number Collected	%	Beck's Biotic Index	Pollution Tolerance Classification
Oligochaeta	6	54.5	III	T,F
Trichoptera				
Cheumatopsyche sp.	1	9.1	II	F
Coleoptera				
Dubiraphia sp.	1	9.1	II	F
Diptera				
Tanytarsus sp.	1	9.1	II	F,I
Thienemanniella sp.	1	9.1	I	I
Polypedilum halterale	1	9.1	I	F,I

Total Collected 11　Diversity 2.05
Number of Taxa 6　Equitibility 1.00

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	2	3	1	--	--
Percent	33.3	50.0	16.7	--	--

Beck's Biotic Index = 7

Station No: SC-2 Location: At bridge on River Road. Shaded area in Southern mixed hardwoods.
Replicate: 2
Collection Date: February 16, 1978

Taxon	Number Collected	%	Beck's Biotic Index	Pollution Tolerance Classification
Oligochaeta	2	33.3	III	T,F
Coleoptera				
Dubiraphia sp.	1	16.7	II	F
Diptera				
Cryptochironomus fulvus	1	16.7	III	T,I
Polypedilum tritum	2	33.3	II	F

Total Collected 6
Number of Taxa 4

Diversity 1.92
Equitibility 1.25

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	--	2	2	--	--
Percent	--	50.0	50.0	--	--

Beck's Biotic Index = 2

Station No: SC-2 Location: At bridge on River Road. Shaded area in
Replicate: 3 Southern mixed hardwoods.
Collection Date: February 16, 1978

Taxon	Number Collected	%	Beck's Biotic Index	Pollution Tolerance Classification
Oligochaeta	9	47.4	III	T,F
Megaloptera				
Sialis sp.	1	5.3	V	F
Coleoptera				
Dubiraphia sp.	1	5.3	II	F
Stenelmis sp.	1	5.3	II	I
Mollusca				
Helisoma sp.	1	5.3	IV	
Diptera				
Cryptochironomus fulvus	5	26.3	III	T,I
Polypedilum tritum	1	5.3	II	F

Total Collected	19	Diversity	2.14
Number of Taxa	7	Equitibility	0.86

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	--	3	2	1	1
Percent	--	42.8	28.6	14.3	14.3

Beck's Biotic Index = 3

Station No: SC-4 Location: At U.S. 41 bridge. Sunlit riffle area.
Replicate: 1 Collection Date: February 16, 1978

Taxon	Number Collected	%	Beck's Biotic Index	Pollution Tolerance Classification
Oligochaeta	10	6.8	III	T,F
Ephemeroptera				
Caenis diminuta	2	1.4	III	T
Trichoptera				
Cheumatopsyche sp.	28	18.9	II	F
Coleoptera				
Dubiraphia sp.	3	2.0	II	F
Microcylloepus sp.	1	0.7	II	I
Diptera				
Simulium sp.	3	2.0	I	I
Rheotanytarsus sp.	4	2.7	II	F
Polypedilum illinoense	92	62.2	II	T,F
Conchapelopia sp.	1	0.7	V	F
Tanytarsus sp.	3	2.0	II	F,I
Cryptochironomus fulvus	1	0.7	III	T,I

Total Collected	148	Diversity	1.86
Number of Taxa	11	Equitibility	0.45

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	1	6	3	--	1
Percent	9.1	54.5	27.3	--	9.1

Beck's Biotic Index = 8

Station No: SC-4 Location: At U.S. 41 bridge. Sunlit riffle area.
Replicate: 2 Collection Date: February 16, 1978

Taxon	Number Collected	%	Beck's Biotic Index	Pollution Tolerance Classification
Oligochaeta	9	2.1	III	T,F
Ephemeroptera				
Caenis diminuta	2	0.5	III	T
Trichoptera				
Cheumatopsyche sp.	124	28.6	II	F
Coleoptera				
Dubiraphia sp.	9	2.1	II	F
Stenelmis sp.	3	0.7	II	I
Microcylloepus sp.	1	0.2	II	I
Diptera				
Simulium sp.	10	2.3	I	I
Thienemanniella sp.	4	0.9	I	I
Polypedilum illinoense	238	54.8	II	T,F
Polypedilum tritum	34	7.8	II	F

Total Collected	434	Diversity	1.80
Number of Taxa	10	Equitibility	0.50

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	2	6	2	--	--
Percent	20.0	60.0	20.0	--	--

Beck's Biotic Index = 10

Station No: SC-4 Location: At U.S. 41 bridge. Sunlit riffle area.
Replicate: 3 Collection Date: February 16, 1978

Taxon	Number Collected	%	Beck's Biotic Index	Pollution Tolerance Classification
Oligochaeta	52	85.2	III	T,F
Diptera				
Cryptochironomus fulvus	5	8.2	III	T,I
Cricotopus sp.	1	1.6	I	I
Polypedilum halterale	3	4.9	I	F,I

Total Collected 61
Number of Taxa 4

Diversity 0.80
Equitibility 0.50

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	2	--	2	--	--
Percent	50.0	--	50.0	--	--

Beck's Biotic Index = 4

Station No: SC-6 Location: Approximately one mile upstream from SC-4.
Replicate: 1 Shaded area in mixed hardwood swamp with hyacinth mat.
Collection Date: February 16, 1978

Taxon	Number Collected	%	Beck's Biotic Index	Pollution Tolerance Classification
Oligochaeta	4	33.3	III	T,F
Coleoptera				
Dytiscidae sp.	4	33.3	V	
Diptera				
Bezzia sp.	2	16.7	III	
Procladius sp.	1	8.3	II	T,F
Psectrocladius sp.	1	8.3	I	F

Total Collected	12	Diversity	2.08
Number of Taxa	5	Equitibility	1.20

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	1	1	2	--	1
Percent	20.0	20.0	40.0	--	20.0

Beck's Biotic Index = 1

Station No: SC-6 Location: Approximately one mile upstream from SC-4.
Replicate: 2 Shaded area in mixed hardwood swamp with hyacinth mat.
Collection Date: February 16, 1978

Taxon	Number Collected	%	Beck's Biotic Index	Pollution Tolerance Classification
Oligochaeta	21	30.4	III	T,F
Hirudinea				
Helobdella stagnalis	2	2.9	V	
Ephemeroptera				
Caenis diminuta	1	1.4	III	T
Odonata				
Agrion sp.	1	1.4	II	
Coleoptera				
Dubiraphia sp.	1	1.4	II	F
Stenelmis sp.	1	1.4	II	
Diptera				
Simulium sp.	8	11.6	I	I
Bezzia sp.	5	7.2	III	
Thienemanniella sp.	2	2.9	I	I
Rheotanytarsus sp.	3	4.3	II	F
Psectrocladius sp.	6	8.7	I	F
Polypedilum illinoense	18	26.1	II	T,F

Total Collected	69	Diversity	2.82
Number of Taxa	12	Equitibility	0.83

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	3	5	3	--	1
Percent	25.0	41.7	25.0	--	8.3

Beck's Biotic Index = 11

Station No: SC-6 Location: Approximately one mile upstream from SC-4.
Replicate: 3 Shaded area in mixed hardwood swamp with hyacinth mat.
Collection Date: February 16, 1978

Taxon	Number Collected	%	Beck's Biotic Index	Pollution Tolerance Classification
Oligochaeta	9	36.0	III	T,F
Hirudinea				
Helobdella stagnalis	3	12.0	V	T
Diptera				
Cryptochironomus fulvus	1	4.0	III	T,I
Rheotanytarsus sp.	2	8.0	II	F
Bezzia sp.	2	8.0	III	
Chironomus attenuatus	3	12.0	III	T
Conchapelopia sp.	1	4.0	V	F
Labrundinia virescens	1	4.0	I	I
Ablabesmyia peleensis	1	4.0	II	F
Polypedilum illinoense	2	8.0	II	F,I

Total Collected	25	Diversity	2.88
Number of Taxa	10	Equitibility	1.00

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	1	3	4	--	2
Percent	10.0	30.0	40.0	--	20.0

Beck's Biotic Index = 5

Station No: SC-6 Location: Approximately one mile upstream from SC-4.
Replicate: 4 Shaded area in mixed hardwood swamp with hyacinth mat.
Collection Date: February 16, 1978

Taxon	Number Collected	%	Beck's Biotic Index	Pollution Tolerance Classification
Oligochaeta	10	19.6	III	T,F
Hirudinea				
Helobdella stagnalis	2	3.9	V	T
Ephemeroptera				
Caenis diminuta	5	9.8	III	T
Odonata				
Enallagma sp.	1	2.0	II	
Decapoda				
Procambarus sp.	1	2.0	II	
Coleoptera				
Dytiscidae sp.	2	3.9	V	
Mollusca				
Physa sp.	2	3.9	III	T
Diptera				
Clinotanypus pinguis	2	3.9	II	F
Bezzia sp.	18	35.3	III	
Cryptochironomus fulvus	1	2.0	III	T,I
Procladius sp.	1	2.0	II	T,F
Psectrocladius sp.	4	7.8	I	F
Ablabesmyia janta	1	2.0	II	F
Rheotanytarsus sp.	1	2.0	II	F

Total Collected	51	Diversity	3.01
Number of Taxa	14	Equitibility	0.86

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	1	6	5	--	2
Percent	7.1	42.8	35.7	--	14.3

Beck's Biotic Index = 8

Station No: SC-7 Location: At railroad trestle on Occidental property.
Replicate: 1 Channelized portion with hyacinths.
Sunlit area.
Collection Date: February 16, 1978

Taxon	Number Collected	%	Beck's Biotic Index	Pollution Tolerance Classification
Oligochaeta	11	84.6	III	T,F
Coleoptera				
Dubiraphia sp.	1	7.7	II	F
Diptera				
Cryptochironomus fulvus	1	7.7	III	T,I

Total Collected	13		Diversity	0.77
Number of Taxa	3		Equitibility	0.67

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	--	1	2	--	--
Percent	--	33.3	66.7	--	--

Beck's Biotic Index = 1

Station No: SC-7 Location: At railroad trestle on Occidental property.
Replicate: 2 Channelized portion with hyacinths.
Sunlit area.
Collection Date: February 16, 1978

Taxon	Number Collected	%	Beck's Biotic Index	Pollution Tolerance Classification
Oligochaeta	184	36.8	III	T,F
Ephemeroptera				
Caenis diminuta	1	0.2	III	T
Trichoptera				
Cheumatopsyche sp.	3	0.6	II	F
Cyrnellus sp.	2	0.4	V	
Coleoptera				
Dytiscidae sp.	3	0.6	V	
Dubiraphia sp.	1	0.2	II	F
Diptera				
Bezzia sp.	200	40.1	III	
Cryptochironomus fulvus	32	6.4	III	T,I
Chironomus attenuatus	40	8.0	III	T
Psectrocladius sp.	24	4.8	I	F
Clinotanypus pinguis	4	0.8	V	F
Simulium sp.	1	0.2	I	I
Chironomus carus	1	0.2	V	T
Polypedilum halterale	2	0.4	I	F,I
Pentaneura inculta	1	0.2	I	F,I

Total Collected 499 Diversity 2.11
Number of Taxa 15 Equitibility 0.40

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	4	2	5	--	4
Percent	26.7	13.3	33.3	--	26.7

Beck's Biotic Index = 10

Station No: SC-7 Location: At railroad trestle on Occidental property.
Replicate: 3 Channelized portion with hyacinths.
Sunlit area.
Collection Date: February 16, 1978

Taxon	Number Collected	%	Beck's Biotic Index	Pollution Tolerance Classification
Oligochaeta	106	91.3	III	T,F
Diptera				
Chironomus carus	1	0.9	III	T
Cricotopus sp.	3	2.6	I	I
Psectrocladius sp.	5	4.3	I	F
Rheotanytarsus exiguus	1	0.9	I	T,I

Total Collected	116		Diversity	0.57
Number of Taxa	5		Equitibility	0.40

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	3	--	2	--	--
Percent	60.0	--	40.0	--	--

Beck's Biotic Index = 6

Station No: SC-7 Location: At railroad trestle on Occidental property.
Replicate: 4 Channelized portion with hyacinths.
Sunlit area.
Collection Date: February 16, 1978

Taxon	Number Collected	%	Beck's Biotic Index	Pollution Tolerance Classification
Oligochaeta	18	40.9	III	T,F
Hirudinea				
Helobdella stagnalis	1	2.3	V	T
Ephemeroptera				
Stenonema smithae	1	2.3	I	I
Trichoptera				
Phylocentropus sp.	5	11.4	V	
Diptera				
Tabanus sp.	1	2.3	V	
Procladius sp.	9	20.4	II	T,F
Bezzia, sp.	4	9.1	III	
Cladotanytarsus sp.	2	4.5	II	F
Phaenopsectra sp.	3	6.8	V	I

Total Collected	44		Diversity	2.51
Number of Taxa	9		Equitibility	0.89

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	1	2	2	--	4
Percent	11.1	22.2	22.2	--	44.4

Beck's Biotic Index = 4

Station No: ABC-8 Location: Culvert at SR-137. Channelized portion, sunlit area.
Replicate: 1
Collection Date: February 16, 1978

Taxon	Number Collected	%	Beck's Biotic Index	Pollution Tolerance Classification
Oligochaeta	38	79.2	III	T,F
Diptera				
Chironomus attenuatus	2	4.2	III	T
Psectrocladius sp.	7	14.6	I	F
Polypedilum tritum	1	2.1	II	F

Total Collected 48
Number of Taxa 4

Diversity 0.98
Equitability: 0.50

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	1	1	2	--	--
Percent	25.0	25.0	50.0	--	--

Beck's Biotic Index = 3

Station No: ABC-8 Location: Culvert at SR-137. Channelized portion, sunlit area.
Replicate: 2
Collection Date: February 16, 1978

Taxon	Number Collected	%	Beck's Biotic Index	Pollution Tolerance Classification
Oligochaeta	114	90.5	III	T,F
Diptera				
Psectrocladius sp.	10	7.9	I	F
Glyptotendipes sp.	1	0.8	III	
Cricotopus sp.	1	0.8	I	I

Total Collected	126		Diversity	0.53
Number of Taxa	4		Equitability:	0.50

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	2	--	2	--	--
Percent	50.0	--	50.0	--	--

Beck's Biotic Index = 4

Station No: ABC-8 Location: Culvert at SR-137. Channelized portion, sunlit area.
Replicate: 3
Collection Date: February 16, 1978

Taxon	Number Collected	%	Beck's Biotic Index	Pollution Tolerance Classification
Oligochaeta	165	91.2	III	T,F
Diptera				
Bezzia sp.	2	1.1	III	
Chironomus attenuatus	7	3.9	III	T
Psectrocladius sp.	5	2.8	I	F
Cricotopus sp.	2	1.1	I	I

Total Collected	181	Diversity	0.59
Number of Taxa	5	Equitibility	0.40

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	2	--	3	--	--
Percent	40.0	--	60.0	--	--

Beck's Biotic Index = 4

Station No: ABC-8 Location: Culvert at SR-137. Channelized portion, sunlit area.
Replicate: 4
Collection Date: February 16, 1978

Taxon	Number Collected	%	Beck's Biotic Index	Pollution Tolerance Classification
Oligochaeta	43	76.8	III	T,F
Diptera				
Chironomus attenuatus	2	3.6	III	T
Cricotopus sp.	3	5.4	I	I
Psectrocladius sp.	7	12.5	I	F
Simulium sp.	1	1.8	I	I

Total Collected 56
Number of Taxa 5
Diversity 1.17
Equitibility 0.60

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	3	--	2	--	--
Percent	60.0	--	40.0	--	--

Beck's Biotic Index = 6

Station No: SC-9 Location: At bridge on Occidental property,
Replicate: 1 channelized, shaded by brush.
Collection Date: February 16, 1978

Taxon	Number Collected	%	Beck's Biotic Index	Pollution Tolerance Classification
Oligochaeta	34	75.6	III	T,F
Ephemeroptera				
Caenis diminuta	3	6.7	III	T
Coleoptera				
Dubiraphia sp.	1	2.2	II	F
Microcyllaepus sp.	1	2.2	II	I
Mollusca				
Sphaerium sp.	1	2.2	III	F
Diptera				
Palpomyia tibialis	1	2.2	III	
Bezzia sp.	2	4.4	III	
Polypedilum halterale	1	2.2	I	F,I
Polypedilum tritum	1	2.2	II	F

Total Collected	45	Diversity	1.50
Number of Taxa	9	Equitibility	0.44

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	1	3	5	--	--
Percent	11.1	33.3	55.6	--	--

Beck's Biotic Index = 5

Station No: SC-9 Location: At bridge on Occidental property,
Replicate: 2 channelized, shaded by brush.
Collection Date: February 16, 1978

Taxon	Number Collected	%	Beck's Biotic Index	Pollution Tolerance Classification
Oligochaeta	38	67.8	III	T,F
Coleoptera				
Dubiraphia sp.	2	3.6	II	F
Stenelmis sp.	3	5.4	I	I
Diptera				
Bezzia sp.	1	1.8	III	
Polypedilum illinoense	2	3.6	II	F,I
Polypedilum halterale	1	1.8	I	F,I
Polypedilum tritum	1	1.8	II	F
Mollusca				
Sphaerium sp.	7	12.5	III	F
Elliptie sp.	1	1.8	V	

Total Collected	56		Diversity	1.74
Number of Taxa	9		Equitibility	0.50

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	2	3	3	--	1
Percent	22.2	33.3	33.3	--	11.1

Beck's Biotic Index = 7

Station No: SC-9 Location: At bridge on Occidental property,
Replicate: 3 channelized, shaded by brush.
Collection Date: February 16, 1978

Taxon	Number Collected	%	Beck's Biotic Index	Pollution Tolerance Classification
Oligochaeta	79	72.5	III	T,F
Ephemeroptera				
Caenis diminuta	1	0.9	III	T
Odonata				
Gomphus sp.	1	0.9	II	
Trichoptera				
Cheumatopsyche sp.	1	0.9	II	F
Athripsodes sp.	1	0.9	V	
Coleoptera				
Dubiraphia sp.	10	9.2	II	F
Microcyllaepus sp.	1	0.9	II	I
Mollusca				
Sphaerium sp.	2	1.8	III	F
Diptera				
Bezzia sp.	10	9.2	III	
Clinotanypus pinguis	1	0.9	II	F
Cryptochironomus fulvus	1	0.9	III	I
Dicrotendipes sp.	1	0.9	II	

Total Collected	109	Diversity	1.57
Number of Taxa	12	Equitibility	0.33

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	--	6	5	--	1
Percent	--	50.0	41.7	--	8.3

Beck's Biotic Index = 6

Station No: SC-9   Location: At bridge on Occidental property,
Replicate: 4   channelized, shaded by brush.
Collection Date: February 16, 1978

Taxon	Number Collected	%	Beck's Biotic Index	Pollution Tolerance Classification
Oligochaeta	103	92.0	III	T,F
Coleoptera				
Stenelmis sp.	1	0.9	II	I
Diptera				
Palpomyia tibialis	1	0.9	V	
Bezzia sp.	3	2.7	III	
Procladius sp.	2	1.8	II	T,F
Clinotanypus pinguis	1	0.9	II	F
Polypedilum tritum	1	0.9	II	F

Total Collected	112	Diversity	0.60
Number of Taxa	7	Equitibility	0.29

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	--	4	2	--	1
Percent	--	57.1	28.6	--	14.3

Beck's Biotic Index = 3

Station No: CB-2 Location: Approximately 1.7 miles downstream from CB-3
Replicate: 1 at bridge on county road. Shaded area in
Southern mixed hardwoods.
Collection Date: February 16, 1978

Taxon	Number Collected	%	Beck's Biotic Index	Pollution Tolerance Classification
Oligochaeta	11	2.7	III	T,F
Trichoptera				
Phylocentropus sp.	3	0.7	V	
Mollusca				
Sphaerium sp.	296	73.6	III	F
Physa sp.	2	0.5	III	
Diptera				
Bezzia sp.	31	7.7	III	
Procladius sp.	7	1.7	II	T,F
Phaenopsectra sp.	51	12.7	V	
Ablabesmyia peleensis	1	0.2	II	F

Total Collected	402	Diversity	1.34
Number of Taxa	8	Equitibility	0.38

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	--	2	4	--	2
Percent	--	25.0	50.0	--	25.0

Beck's Biotic Index = 2

Station No: CB-2 Location: Approximately 1.7 miles downstream from CB-3
Replicate: 2 at bridge on county road. Shaded area in
Southern mixed hardwoods.
Collection Date: February 16, 1978

Taxon	Number Collected	%	Beck's Biotic Index	Pollution Tolerance Classification
Oligochaeta	32	33.0	III	T,F
Trichoptera				
Phylocentropus sp.	4	4.1	V	
Diptera				
Stenochironomus hilaris	2	2.1	I	I
Bezzia sp.	9	9.3	III	
Procladius sp.	6	6.2	II	T,F
Phaenopsectra sp.	35	36.1	V	I
Microtendipes sp.	4	4.1	V	I
Tanytarsus sp.	5	5.2	II	F,I

Total Collected 97
Number of Taxa 8

Diversity 2.34
Equitibility 0.88

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	1	2	2	--	3
Percent	12.5	25.0	25.0	--	37.5

Beck's Biotic Index = 4

Station No: RC-2 Location: 1.5 miles upstream from confluence with
Replicate: 1 Suwannee River, upstream from permanent USGS
gauging station. Shaded area in Southern
mixed hardwoods.
Collection Date: February 16, 1978

Taxon	Number Collected	%	Beck's Biotic Index	Pollution Tolerance Classification
Oligochaeta	12	26.7	III	T,F
Nematoda	8	17.8		
Amphipoda				
Hyallela azteca	4	8.9	II	F
Trichoptera				
Cyrnellus sp.	1	2.2	V	
Phylocentropus sp.	1	2.2	V	
Coleoptera				
Dytiscidae sp.	1	2.2		
Diptera				
Simulium sp.	2	4.4	I	I
Procladius sp.	1	2.2	II	T,F
Cryptochironomus fulvus	1	2.2	III	T,I
Tipulidae sp.	1	2.2	IV	F
Ablabesmyia janta	4	8.9	II	F
Polypedilum tritum	1	2.2	II	F
Phaenopsectra sp.	1	2.2	V	I
Micropsectra sp.	5	11.1	V	F,I
Conchapelopia sp.	2	4.4	V	F

Total Collected	45	Diversity	3.30
Number of Taxa	15	Equitibility	0.93

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	1	4	2	1	5
Percent	6.7	26.7	13.3	6.7	33.3

Beck's Biotic Index = 6

Station No: RC-2 Location: 1.5 miles upstream from confluence with Suwannee River. Upstream from permanent USGS gauging station. Shaded area in Southern mixed hardwoods.
Replicate: 2
Collection Date: February 16, 1978

Taxon	Number Collected	%	Beck's Biotic Index	Pollution Tolerance Classification
Oligochaeta	7	26.9	III	T,F
Nematoda	1	3.8		
Trichoptera				
Cyrnellus sp.	1	3.8	V	
Limnephilus sp.	1	3.8	V	
Coleoptera				
Dytiscidae sp.	1	3.8	V	
Diptera				
Argyra sp.	1	3.8		
Ablabesmyia janta	2	7.7	II	F
Simulium sp.	2	7.7	I	I
Cryptochironomus fulvus	1	3.8	III	T,I
Bezzia sp.	1	3.8	III	
Tanytarsus sp.	4	15.4	II	F,I
Phaenopsectra sp.	3	11.5	V	I
Micropsectra sp.	1	3.8	V	F,I

Total Collected	26	Diversity	3.30
Number of Taxa	13	Equitibility	1.08

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	1	2	3	--	5
Percent	7.7	15.4	23.1	--	38.5

Beck's Biotic Index = 4

Station No: RC-2 Location: 1.5 miles upstream from confluence with
Replicate: 3 Suwannee River. Upstream from permanent USGS
gauging station. Shaded area in Southern
mixed hardwoods.
Collection Date: February 16, 1978

Taxon	Number Collected	%	Beck's Biotic Index	Pollution Tolerance Classification
Oligochaeta	5	13.9	III	T,F
Amphipoda				
Hyallela azteca	5	13.9	II	F
Ephemeroptera				
Leptophlebia intermedia	2	5.6	V	
Odonata				
Agria sp.	1	2.8	I	
Trichoptera				
Limnephilus sp.	1	2.8	V	
Megaloptera				
Sialis sp.	1	2.8	V	
Coleoptera				
Dubiraphia sp.	1	2.8	II	F
Dytiscidae sp.	3	8.3		
Diptera				
Stenochironomus hilaris	1	2.8	I	I
Bezzia sp.	1	2.8	III	
Ablabesmyia peleensis	9	25.0	II	F
Simulium sp.	3	8.3	I	I
Corynoneura sp.	1	2.8	I	I
Tanytarsus sp.	2	5.6	II	F,I

Total Collected	36	Diversity	3.36
Number of Taxa	14	Equitibility	1.07

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	4	4	2	--	3
Percent	28.6	28.6	14.3	--	21.4

Beck's Biotic Index = 12

Station No: RC-2 Location: 1.5 miles upstream from confluence with
Replicate: 4 Suwannee River. Upstream from permanent USGS
gauging station. Shaded area in Southern
mixed hardwoods.
Collection Date: February 16, 1978

Taxon	Number Collected	%	Beck's Biotic Index	Pollution Tolerance Classification
Isopoda				
Asellus sp.	1	4.2	I	
Amphipoda				
Hyallela azteca	1	4.2	II	F
Decapoda				
Procambarus sp.	1	4.2	II	
Ephemeroptera				
Leptophlebia intermedia	1	4.2	V	
Ephemerella sp.	2	8.3	V	
Trichoptera				
Agrypnia sp.	1	4.2	V	
Limnephilus sp.	1	4.2	V	
Megaloptera				
Sialis sp.	1	4.2	V	F
Diptera				
Argyra sp.	1	4.2	V	
Corynoneura sp.	2	8.3	I	I
Stenochironomus hilaris	2	8.3	I	I
Ablabesmyia peleensis	5	20.8	II	F
Simulium sp.	1	4.2	I	I
Tanytarsus sp.	1	4.2	II	F,I
Phaenopsectra sp.	1	4.2	V	I
Larsia indistincta	1	4.2	V	
Conchapelopia sp.	1	4.2	V	F

Total Collected 24
Number of Taxa 17

Diversity 3.85
Equitibility 1.24

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	4	4	---	--	9
Percent	23.5	23.5	---	--	52.9

Beck's Biotic Index = 12

Station No: HC-1 Location: At bridge on S.R. 135. Shaded area in
Replicate: 1 Southern mixed hardwoods.
Collection Date: February 16, 1978

Taxon	Number Collected	%	Beck's Biotic Index	Pollution Tolerance Classification
Oligochaeta	6	54.5	III	T,F
Ephemeroptera				
Caenis diminuta	1	9.1	III	T
Coleoptera				
Microcylloepus sp.	1	9.1	II	I
Stenelmis sp.	1	9.1	II	I
Diptera				
Tanytarsus sp.	2	18.2	II	F,I

Total Collected	11	Diversity	1.87
Number of Taxa	5	Equitibility	1.00

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	--	3	2	--	--
Percent	--	60.0	40.0	--	--

Beck's Biotic Index = 3

Station No: HC-1 Location: At bridge on S.R. 135. Shaded area in
Replicate: 2 Southern mixed hardwoods.
Collection Date: February 16, 1978

Taxon	Number Collected	%	Beck's Biotic Index	Pollution Tolerance Classification
Oligochaeta	5	31.2	III	T,F
Ephemeroptera				
Caenis diminuta	2	12.5	III	T
Coleoptera				
Dubiraphia sp.	1	6.2	II	F
Diptera				
Tanytarsus sp.	2	12.5	II	F,I
Rheotanytarsus sp.	3	18.8	II	F
Polypedilum tritum	1	6.2	II	F
Polypedilum halterale	1	6.2	I	F,I
Micropsectra sp.	1	6.2	V	F,I

Total Collected	16	Diversity	2.73
Number of Taxa	8	Equitibility	1.13

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	1	4	2	--	1
Percent	12.5	50.0	25.0	--	12.5

Beck's Biotic Index = 6

Station No: HC-1 Location: At bridge on S.R. 135. Shaded area in
Replicate: 3 Southern mixed hardwoods.
Collection Date: February 16, 1978

Taxon	Number Collected	%	Beck's Biotic Index	Pollution Tolerance Classification
Oligochaeta	2	10.5	III	T,F
Ephemeroptera				
Caenis diminuta	2	10.5	III	T
Odonata				
Macromia sp.	1	5.3	I	T
Trichoptera				
Cheumatopsyche sp.	1	5.3	II	F
Coleoptera				
Stenelmis sp.	2	10.5	II	I
Microcylloepus sp.	3	15.8	II	I
Diptera				
Cryptochironomus fulvus	1	5.3	III	T,I
Tanytarsus sp.	4	21.0	II	F,I
Rheotanytarsus sp.	2	10.5	II	F
Micropsectra sp.	1	5.3	V	I

Total Collected	19		Diversity	3.16
Number of Taxa	10		Equitibility	1.30

Beck's Biotic Class					
Classification	I	II	III	IV	V
Number of Taxa	1	5	3	--	1
Percent	10.0	50.0	30.0	--	10.0

Beck's Biotic Index = 6

Station No: HC-1 Location: At bridge on S.R. 135. Shaded area in
Replicate: 4 Southern mixed hardwoods.
Collection Date: February 16, 1978

Taxon	Number Collected	%	Beck's Biotic Index	Pollution Tolerance Classification
Oligochaeta	4	7.0	III	T,F
Ephemeroptera				
Caenis diminuta	1	1.8	III	T
Trichoptera				
Cheumatopsyche sp.	4	7.0	II	F
Coleoptera				
Dubiraphia sp.	1	1.8	II	F
Stenelmis sp.	5	8.8	II	I
Ancyronyx variegatus	1	1.8	V	I
Diptera				
Cryptochironomus fulvus	3	5.3	III	T,I
Simulium sp.	2	3.5	I	I
Thienemanniella sp.	1	1.8	I	I
Polypedilum halterale	8	14.0	I	F,I
Cricotopus sp.	4	7.0	I	I
Polypedilum illinoense	3	5.3	II	F,I
Tanytarsus sp.	8	14.0	II	F,I
Rheotanytarsus sp.	4	7.0	II	F
Micropsectra sp.	8	14.0	V	F,I

Total Collected	57	Diversity	3.60
Number of Taxa	15	Equitibility	1.20

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	4	6	3	--	2
Percent	26.7	40.0	20.0	--	13.3

Beck's Biotic Index = 14

Station No: RO-2 Location: 1.8 miles upstream from confluence with
Replicate: 1 Suwannee River at S.R. 135 bridge.
Shaded area in Southern mixed hardwoods.
Collection Date: February 16, 1978

Taxon	Number Collected	%	Beck's Biotic Index	Pollution Tolerance Classification
Oligochaeta	1	5.9	III	T,F
Ephemeroptera				
Stenonema smithae	1	5.9	I	I
Trichoptera				
Cheumatopsyche sp.	1	5.9	II	F
Diptera				
Simulium sp.	8	47.0	I	I
Stenochironomus hilaris	1	5.9	I	I
Bezzia sp.	1	5.9	III	
Chironomus carus	1	5.9	V	T
Microtendipes sp.	2	11.8	V	I
Dicrotendipes sp.	1	5.9	II	

Total Collected	17		Diversity	2.56
Number of Taxa	9		Equitibility	0.89

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	3	2	2	--	2
Percent	33.3	22.2	22.2	--	22.2

Beck's Biotic Index = 8

Station No: RO-2 Location: 1.8 miles upstream from confluence with
Replicate: 2 Suwannee River at S.R. 135 bridge.
Shaded area in Southern mixed hardwoods.
Collection Date: February 16, 1978

Taxon	Number Collected	%	Beck's Biotic Index	Pollution Tolerance Classification
Oligochaeta	8	25.8	III	T,F
Ephemeroptera				
Caenis diminuta	2	6.4	III	T
Ephemerella trilineata	2	6.4	V	
Stenonema smithae	1	3.2	I	I
Coleoptera				
Stenelmis sp.	1	3.2	II	
Dytiscidae sp.	1	3.2	V	
Diptera				
Simulium sp.	8	25.8	I	I
Procladius sp.	1	3.2	II	T,F
Eukiefferiella sp.	2	6.4	I	
Phaenopsectra sp.	2	6.4	V	I
Tanytarsus sp.	1	3.2	II	F,I
Microtendipes sp.	1	3.2	V	I
Polypedilum tritum	1	3.2	II	F

Total Collected	31	Diversity	3.15
Number of Taxa	13	Equitibility	0.96

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	3	4	2	--	4
Percent	23.1	30.8	15.4	--	30.8

Beck's Biotic Index = 10

Station No: RO-2 Location: 1.8 miles upstream from confluence with
Replicate: 3 Suwannee River at S.R. 135 bridge.
Shaded area in Southern mixed hardwoods.
Collection Date: February 16, 1978

Taxon	Number Collected	%	Beck's Biotic Index	Pollution Tolerance Classification
Oligochaeta	1	4.0	III	T,F
Isopoda				
Asellus sp.	2	8.0	I	
Diptera				
Stenochironomus hilaris	3	12.0	I	I
Clinotanypus pinguis	1	4.0	V	F
Ablabesmyia janta	2	8.0	II	F
Simulium sp.	2	8.0	I	I
Corynoneura sp.	2	8.0	I	I
Bezzia sp.	1	4.0	III	
Polypedilum illinoense	2	8.0	II	F,I
Phaenopsectra sp.	4	16.0	V	I
Stictochironomus sp.	3	12.0	I	
Tanytarsus sp.	2	8.0	II	F,I

Total Collected	25	Diversity	3.46
Number of Taxa	12	Equitibility	1.33

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	5	3	2	--	2
Percent	41.7	25.0	16.7	--	16.7

Beck's Biotic Index = 13

Station No: RO-2 Location: 1.8 miles upstream from confluence with
Replicate: 4 Suwannee River at S.R. 135 bridge.
Shaded area in Southern mixed hardwoods.
Collection Date: February 16, 1978

Taxon	Number Collected	%	Beck's Biotic Index	Pollution Tolerance Classification
Oligochaeta	29	13.1	III	T,F
Nematoda	1	0.4	V	
Ephemeroptera				
Caenis diminuta	3	1.4	III	T
Ephemerella sp.	1	0.4	V	
Trichoptera				
Cheumatopsyche sp.	1	0.4	II	F
Mollusca				
Sphaerium sp.	1	0.4	III	F
Diptera				
Simulium sp.	170	76.6	I	I
Psectrocladius sp.	2	0.9	I	F
Bezzia sp.	1	0.4	III	
Dicrotendipes sp.	4	1.8	II	
Cricotopus sp.	5	2.2	I	I
Phaenopsectra sp.	4	1.8	V	I

Total Collected	222	Diversity	1.33
Number of Taxa	12	Equitibility	0.25

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	3	2	4	--	3
Percent	25.0	16.7	33.3	--	25.0

Beck's Biotic Index = 8

Station No: SR-7 Location: Upstream on Suwannee River from confluence with Swift Creek.
Replicate: 1
Collection Date: February 16, 1978

Taxon	Number Collected	%	Beck's Biotic Index	Pollution Tolerance Classification
Oligochaeta	1	6.7	III	T,F
Diptera				
Bezzia sp.	7	46.7	III	
Cryptochironomus fulvus	2	13.3	III	T,I
Cladotanytarsus sp.	2	13.3	II	F
Eukiefferiella sp.	1	6.7	I	
Harnischia sp.	1	6.7	V	
Polypedilum halterale	1	6.7	I	F,I

Total Collected	15	Diversity	2.33
Number of Taxa	7	Equitibility	1.00

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	2	1	3	--	1
Percent	28.6	14.3	42.8	--	14.3

Beck's Biotic Index = 5

Station No: SR-7 Location: Upstream on Suwannee River from confluence
Replicate: 2 with Swift Creek.
Collection Date: February 16, 1978

Taxon	Number Collected	%	Beck's Biotic Index	Pollution Tolerance Classification
Oligochaeta	3	15.8	III	T,F
Coleoptera				
Dubiraphia sp.	1	5.3	II	F
Diptera				
Bezzia sp.	1	5.3	III	
Procladius sp.	7	36.8	II	T,F
Cryptochironomus fulvus	1	5.3	III	T,I
Clinotanypus pinguis	1	5.3	II	F
Cricotopus sp.	2	10.5	I	I
Tanytarsus sp.	2	10.5	II	F,I
Stempellina sp.	1	5.3	V	

Total Collected	19		Diversity	2.75
Number of Taxa	9		Equitibility	1.00

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	1	4	3	--	1
Percent	11.1	44.4	33.3	--	11.1

Beck's Biotic Index = 5

Station No: SR-8 Location: Downstream on Suwannee River from confluence with Swift Creek.
Replicate: 1
Collection Date: February 16, 1978

Taxon	Number Collected	%	Beck's Biotic Index	Pollution Tolerance Classification
Oligochaeta	1	4.3	III	T,F
Coleoptera				
Stenelmis sp.	1	4.3	II	I
Diptera				
Bezzia sp.	1	4.3	III	
Procladius sp.	3	13.0	II	T,F
Cricotopus sp.	2	8.7	I	I
Polypedilum illinoense	1	4.3	II	F,I
Tanytarsus sp.	14	60.9	II	F,I

Total Collected	23	Diversity	1.91
Number of Taxa	7	Equitibility	0.71

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	1	4	2	--	--
Percent	14.3	57.1	28.6	--	--

Beck's Biotic Index = 6

Station No: SR-8 Location: Downstream on Suwannee River from confluence with Swift Creek.
Replicate: 2
Collection Date: February 16, 1978

Taxon	Number Collected	%	Beck's Biotic Index	Pollution Tolerance Classification
Oligochaeta	8	32.0	III	T,F
Ephemeroptera				
Leptophlebia intermedia	1	4.0	V	
Diptera				
Bezzia sp.	4	16.0	III	
Procladius sp.	4	16.0	II	T,F
Tanytarsus sp.	2	8.0	II	F,I
Micropsectra sp.	3	12.0	V	F,I
Cricotopus sp.	2	8.0	I	I
Cryptochironomus fulvus	1	4.0	III	T,I

Total Collected	25	Diversity	2.69
Number of Taxa	8	Equitibility	1.13

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	1	2	3	--	2
Percent	12.5	25.0	37.5	--	25.0

Beck's Biotic Index = 4

Station No: SR-8 Location: Downstream on Suwannee River from confluence with Swift Creek.
Replicate: 3
Collection Date: February 16, 1978

Taxon	Number Collected	%	Beck's Biotic Index	Pollution Tolerance Classification
Coleoptera				
Berosus sp.	1	33.3	V	T
Diptera				
Conchapelopia sp.	1	33.3	V	F
Rheotanytarsus sp.	1	33.3	II	F

Total Collected	3	Diversity	1.58
Number of Taxa	3	Equitibility	1.33

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	--	1	---	--	2
Percent	--	33.3	---	--	66.7

Beck's Biotic Index = 1

APPENDIX C-4

Taxa, Beck's Biotic Index, and Pollution Tolerance Classification of Benthic Organisms Collected in Winter 1978 on Artificial Substrates (Hester-Dendy's) in the Study Area

Station: RO-2
Replicate: 1

Location: 1.8 miles upstream from confluence with Suwannee River at S.R. 135 bridge, shaded area in Southern mixed hardwoods.

Date of Collection: February 23, 1978

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Ephemeroptera				
Stenonema smithae	1	9.1	I	I
Diptera				
Clinotanypus pinguis	1	9.1	II	F
Micropsectra sp.	2	18.2	V	F,I
Simulium sp.	7	63.6	I	I

Total Collected: 11
Number of Taxa: 4

Diversity: 1.49
Equitability: 1.00

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	2	1	--	--	1
Percent	50.0	25.0	--	--	25.0

Beck's Biotic Index = 5

Station: RO-2
Replicate: 2

Location: 1.8 miles upstream from confluence with Suwannee River at S.R. 135 bridge, shaded area in Southern mixed hardwoods.
Date of Collection: February 23, 1978

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Diptera				
Polypedilum halterale	2	13.3	I	F,I
Simulium sp.	12	80	I	I
Stenochironomus bilaris	1	6.7	I	I

Total Collected: 15
Number of Taxa: 3

Diversity: 0.91
Equitability: 0.67

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	3	--	--	--	--
Percent	100.0	--	--	--	--

Beck's Biotic Index = 6

Station: RO-2
Replicate: 3

Location: 1.8 miles upstream from confluence with Suwannee River at S.R. 135 bridge, shaded area in Southern mixed hardwoods.

Date of Collection: February 23, 1978

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Oligochaeta	2	4.9	III	T,F
Diptera				
Simulium sp.	31	75.6	I	I
Polypedilum illinoense	6	14.6	II	F,I
Thienemanniella sp.	2	4.9	I	I

Total Collected: 41
Number of Taxa: 4

Diversity: 1.14
Equitability: 0.75

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	2	1	1	--	--
Percent	50.0	25.0	25.0	--	--

Beck's Biotic Index = 5

Station: HC-1
Replicate: 1

Location: At bridge on S.R. 135, shaded area in Southern mixed hardwoods.
Date of Collection: February 23, 1978

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Oligochaeta	7	5.4	III	T,F
Isopoda				
Asellus sp.	4	3.1	I	
Amphipoda				
Hyalella azteca	4	3.1	II	F
Ephemeroptera				
Caenis diminuta	2	1.5	III	T
Trichoptera				
Chimarra perigua	3	2.3	V	I
Cheumatopsyche sp.	4	3.1	II	F
Coleoptera				
Dubiraphia sp.	1	0.8	V	F
Microcylloepus sp.	11	8.5	II	I
Ancyronyx variegatus	3	2.3	V	I
Dytiscidae sp.	2	1.5	V	
Diptera				
Simulium sp.	2	1.5	I	I
Tanytarsus sp.	7	5.4	II	F,I
Micropsectra sp.	6	4.6	V	F,I
Thienemanniella sp.	17	13.0	I	I
Corynoneura sp.	2	1.5	I	I
Trichocladius sp.	7	5.4	V	I
Polypedilum illinoense	42	32.3	II	F,I
Potthastia sp.	6	4.6	V	

Total Collected: 130
Number of Taxa: 18

Diversity: 3.44
Equitability: 0.89

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	4	5	2	--	7
Percent	22.2	27.8	11.1	--	38.9

Beck's Biotic Index = 13

Station: HC-1
Replicate: 2

Location: At bridge on S.R. 135, shaded area in Southern mixed hardwoods.
Date of Collection: February 23, 1978

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Ologochaeta	2	1.5	III	T,F
Ephemeroptera				
Caenis diminuta	2	1.5	III	T
Trichoptera				
Cheumatopsyche sp.	3	2.3	II	F
Coleoptera				
Ancyronyx variegatus	3	2.3	V	I
Microcylloepus sp.	13	10.0	II	I
Diptera				
Simulium sp.	16	12.3	I	I
Corynoneura sp.	2	1.5	I	I
Thienemanniella sp.	30	23.1	I	I
Trichocladius sp.	14	10.8	V	I
Polypedilum illinoense	35	26.9	II	F,I
Rheotanytarsus sp.	5	3.8	II	F
Micropsectra sp.	5	3.8	V	F,I
Syrphidae				
Empididae sp.	1	0.8	V	F

Total Collected: 130
Number of Taxa: 13

Diversity: 2.98
Equitability: 1.00

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	3	4	2	--	4
Percent	23.1	30.8	15.4	--	30.8

Beck's Biotic Index = 10

Station: HC-1 Location: At bridge on S.R. 135, shaded area
Replicate: 3 in Southern mixed hardwoods.
Date of Collection: February 23, 1978

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Oligochaeta	11	11.3	III	T,F
Isopoda				
Asellus sp.	1	1.0	I	
Ephemeroptera				
Caenis diminuta	2	2.1	III	T
Trichoptera				
Cheumatopsyche sp.	3	3.1	II	F
Coleoptera				
Microcylloepus sp.	11	11.3	II	I
Dytiscidae sp.	2	2.1	V	
Diptera				
Simulium sp.	3	3.1	I	I
Corynoneura sp.	6	6.2	I	I
Thienemanniella sp.	13	13.4	I	I
Polypedilum scalaenum	8	8.2	III	T,F
Polypedilum illinoense	17	17.5	II	F,I
Tanytarsus sp.	12	12.4	II	F,I
Brillia sp.	8	8.2	V	I

Total Collected: 97
Number of Taxa: 13

Diversity: 3.37
Equitability: 1.15

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	4	4	3	--	2
Percent	30.8	30.8	23.1	--	15.4

Beck's Biotic Index = 12

Station: HC-1
Replicate: 4

Location: At bridge on S.R. 135, shaded area in Southern mixed hardwoods.
Date of Collection: February 23, 1978

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Ologochaeta	1	2.9	III	T,F
Trichoptera				
Cheumatopsyche sp.	2	5.9	II	F
Coleoptera				
Ancyronyx variegatus	1	2.9	V	I
Microcylloepus sp.	1	2.9	II	I
Diptera				
Simulium sp.	5	14.7	I	I
Corynoneura sp.	1	2.9	I	I
Thienemanniella sp.	4	11.8	I	I
Tanytarsus sp.	11	32.3	II	F,I
Rheotanytarsus exigus	2	5.9	I	T,I
Rheotanytarsus sp.	2	5.9	II	F
Trichocladius sp.	4	11.8	V	I

Total Collected: 34
Number of Taxa: 11

Diversity: 2.98
Equitability: 1.00

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	4	4	1	--	2
Percent	36.4	36.4	9.1	--	18.2

Beck's Biotic Index = 12

Station: CB-2 Location: Approximately 1.7 miles downstream
Replicate: 1 from CB-3 at bridge on county road,
shaded area in Southern mixed hardwoods.
Date of Collection: February 23, 1978

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Ephemeroptera				
Stenonema proximum	2	11.1	I	I
Stenonema smithae	2	11.1	I	I
Diptera				
Thienemanniella sp.	1	5.5	I	I
Rheotanytarsus sp.	1	5.5	II	F
Polypedilum illinoense	10	55.6	II	F,I
Polypedilum fallax	2	11.1	I	F,I

Total Collected:	18	Diversity:	1.99
Number of Taxa:	6	Equitability:	0.83

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	4	2	--	--	--
Percent	66.7	33.3	--	--	--

Beck's Biotic Index = 10

Station: CB-2
Replicate: 2

Location: Approximately 1.7 miles downstream from CB-3 at bridge on county road, shaded area in Southern mixed hardwoods.

Date of Collection: February 23, 1978

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Diptera				
Micropsectra sp.	1	12.5	V	F,I
Polypedilum fallax	2	25.0	I	F,I
Polypedilum illinoense	4	50.0	II	F,I
Rheotanytarsus sp.	1	12.5	II	F

Total Collected: 8
Number of Taxa: 4

Diversity: 1.75
Equitability: 1.00

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	1	2	--	--	1
Percent	25.0	50.0	--	--	25.0

Beck's Biotic Index = 4

Station: CB-2
Replicate: 3

Location: Approximately 1.7 miles downstream from CB-3 at bridge on county road, shaded area in Southern mixed hardwoods.

Date of Collection: February 23, 1978

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Diptera				
Polypedilum fallax	3	11.1	I	F,I
Polypedilum illinoense	12	44.4	II	F,I
Polypedilum scalaenum	5	18.5	III	T,F
Rheotanytarsus sp.	6	22.2	II	F
Thienemanniella sp.	1	3.7	I	I

Total Collected: 27
Number of Taxa: 5

Diversity: 1.98
Equitability: 1.00

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	2	2	1	--	--
Percent	40.0	40.0	20.0	--	--

Beck's Biotic Index = 6

Station: CB-2
Replicate: 4

Location: Approximately 1.7 miles downstream from CB-3 at bridge on county road, shaded area in Southern mixed hardwoods.

Date of Collection: February 23, 1978

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Trichoptera				
Cheumatopsyche sp.	1	5.9	II	F
Diptera				
Rheotanytarsus sp.	1	5.9	II	F
Micropsectra sp.	2	11.8	V	F,I
Polypedilum illinoense	8	47.1	II	F,I
Tanytarsus sp.	1	5.9	II	F,I
Polypedilum fallax	4	23.5	I	F,I

Total Collected: 17
Number of Taxa: 6

Diversity: 2.09
Equitability: 1.00

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	1	4	--	--	1
Percent	16.7	60.7	--	--	16.7

Beck's Biotic Index = 6

Station: SR-7
Replicate: 1

Location: Upstream on Suwannee River from confluence with Swift Creek.
Date of Collection: February 23, 1978

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Ephemeroptera				
Stenonema smithae	3	0.5	I	I
Plecoptera				
Isogenus sp.	1	0.2	V	
Trichoptera				
Hydropsyche simulans	1	0.2	I	I
Chimarra perigua	2	0.3	I	I
Diptera				
Simulium sp.	520	79.9	I	I
Eukiefferiella sp.	124	19.0	I	

Total Collected: 651
Number of Taxa: 6

Diversity: 0.80
Equitability: 0.33

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	5	--	--	--	1
Percent	83.3	--	--	--	16.7

Beck's Biotic Index = 10

Station: SR-8
Replicate: 1

Location: Downstream on Suwannee River from confluence with Swift Creek.
Date of Collection: February 23, 1978

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Ephemeroptera				
Stenonema smithae	1	2.7	I	I
Trichoptera				
Cheumatopsyche sp.	1	2.7	II	F
Diptera				
Simulium sp.	6	16.2	I	I
Empididae sp.	1	2.7	V	F
Eukiefferiella sp.	27	73.0	I	
Conchapelopia sp.	1	2.7	V	F

Total Collected: 37
Number of Taxa: 6

Diversity: 1.32
Equitability: 0.50

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	3	1	--	--	2
Percent	50.0	16.7	--	--	33.3

Beck's Biotic Index = 7

Station: SR-8
Replicate: 2

Location: Downstream on Suwannee River from confluence with Swift Creek.
Date of Collection: Feburary 23, 1978

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Diptera				
Cricotopus sp.	9	60.0	I	I
Eukiefferiella sp.	4	26.7	I	
Polypedilum illinoense	2	13.3	II	F,I

Total Collected: 15
Number of Taxa: 3

Diversity: 1.34
Equitability: 1.00

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	2	1	--	--	--
Percent	66.7	33.3	--	--	--

Beck's Biotic Index = 5

Station: SC-2
Replicate: 1
Location: At bridge on River Road. Shaded area in Southern mixed hardwoods.
Date of Collection: February 23, 1978

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Oligochaeta	3	4.5	III	T,F
Isopoda				
Asellus sp.		1.5	I	
Trichoptera				
Hydropsyche simulans	7	10.6	I	I
Caleoptera				
Scirtes sp.	1	1.5	V	
Diptera				
Thienemanniella sp.	8	12.2	I	I
Corynoneura sp.	2	3.0	I	I
Micropsectra sp.	5	7.6	V	F,I
Polypedilum illinoense	39	59.1	II	F,I

Total Collected: 66
Number of Taxa: 8
Diversity: 1.98
Equitability: 0.63

Beck's Biotic Class

Classification	I	II	III	IV	V
Number of Taxa	4	1	1	--	2
Percent	50.0	12.5	12.5	--	25.0

Beck's Biotic Index = 9

Station: SC-2
Replicate: 2

Location: At bridge on River Road. Shaded area in Southern mixed hardwoods.
Date of Collection: February 23, 1978

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Oligochaeta	2	1.0	III	T,F
Trichoptera				
Cheumatopsyche sp.	10	5.0	II	F
Hydropsyche simulans	24	12.0	I	I
Coleoptera				
Microcylloepus sp.	1	0.5	II	I
Diptera				
Simulium sp.	2	1.0	I	I
Corynoneura sp.	1	0.5	I	I
Thienemanniella sp.	19	9.5	I	I
Tanytarsus sp.	2	1.0	II	F,I
Polypedilum illinoense	138	69.3	II	F,I

Total Collected: 199
Number of Taxa: 9

Diversity: 1.55
Equitability: 0.44

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	4	4	1	--	--
Percent	44.4	44.4	11.1	--	--

Beck's Biotic Index = 12

Station: SC-2
Replicate: 3

Location: At bridge on River Road. Shaded area in Southern mixed hardwoods.
Date of Collection: February 23, 1978

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Oligochaeta	1	1.3	III	T,F
Trichoptera				
Cheumatopsyche sp.	4	5.1	II	F
Hydropsyche simulans	13	16.5	I	I
Diptera				
Ablabesmyia peleensis	2	2.5	II	F
Polypedilum illinoense	58	73.4	II	F,I
Simulium sp.	1	1.3	I	I

Total Collected: 79
Number of Taxa: 6

Diversity: 1.27
Equitability: .50

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	2	3	1	--	--
Percent	33.3	50.0	16.7	--	--

Beck's Biotic Index = 7

Station: SC-2
Replicate: 4

Location: At bridge on River Road. Shaded area in Southern mixed hardwoods.
Date of Collection: February 23, 1978

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Trichoptera				
Cheumatopsyche sp.	3	7.1	II	F
Hydropsyche simulans	6	14.3	I	I
Coleoptera				
Hydroporus sp.	1	2.4	V	
Diptera				
Polypedilum illinoense	28	66.7	II	F,I
Polypedilum scalaenum	4	9.5	III	F,I

Total Collected: 42
Number of Taxa: 5

Diversity: 1.51
Equitability: 0.80

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	1	2	1	--	1
Percent	20.0	40.0	20.0	--	20.0

Beck's Biotic Index = 4

Station: SC-4
Replicate: 1

Location: At U.S. 41 bridge. Sunlit riffle area.
Date of Collection: February 23, 1978

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Oligochaeta	12	12.9	III	T,F
Ephemeroptera				
Caenis diminuta	1	1.0	III	T
Trichoptera				
Cheumatopsyche sp.	18	19.3	II	F
Cyrnellus sp.	1	1.0	V	
Hydropsyche simulans	1	1.0	I	I
Diptera				
Simulium sp.	1	1.0	I	I
Thienemanniella sp.	13	14.0	I	I
Rheotanytarsus sp.	5	5.4	II	F
Polypedilum illinoense	36	38.7	II	F,I
Polypedilum fallax	5	5.4	I	F,I

Total Collected: 93
Number of Taxa: 10

Diversity: 2.50
Equitability: 0.80

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	4	3	2	--	1
Percent	40.0	30.0	20.0	--	10.0

Beck's Biotic Index = 11

Station: SC-4
Replicate: 2

Location: At U.S. 41 bridge. Sunlit riffle area.
Date of Collection: February 23, 1978

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Oligochaeta	5	5.6	III	T,F
Trichoptera				
Cheumatopsyche sp.	18	20.2	II	F
Hydropsyche simulans	3	3.4	I	I
Diptera				
Simulium sp.	5	5.6	I	I
Corynoneura sp.	1	1.1	I	I
Rheotanytarsus sp.	3	3.4	II	F
Polypedilum illinoense	54	60.7	II	F,I

Total Collected: 89
Number of Taxa: 7

Diversity: 1.77
Equitability: 0.71

Beck's Biotic Class					
Classification	I	II	III	IV	V
Number of Taxa	3	3	1	--	--
Percent	42.9	42.9	14.2	--	--

Beck's Biotic Index = 9

Station: SC-4
Replicate: 3

Location: At U.S. 41 bridge. Sunlit riffle area.
Date of Collection: February 23, 1978

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Oligochaeta	9	5.4	III	T,F
Trichoptera				
Cheumatopsyche sp.	44	26.5	II	F
Hydropsyche simulans	2	1.2	I	I
Megaloptera				
Corydalus cornutus	1	0.6	I	F,I
Diptera				
Simulium sp.	11	6.6	I	I
Thienemanniella sp.	35	21.1	I	I
Rheotanytarsus sp.	4	2.4	II	F
Polypedilum illinoense	60	36.1	II	F,I

Total Collected: 166
Number of Taxa: 8

Diversity: 2.25
Equitability: 0.88

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	4	3	1	--	--
Percent	50.0	37.5	12.5	--	--

Beck's Biotic Index = 11

Station: ABC-8 Location: Culvert at S.R. 137. Channelized
Replicate: 1 portion, sunlit area.
Date of Collection: February 23, 1978

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Diptera				
Psectrocladius sp.	8	88.9	I	F
Polypedilum illinoense	1	11.1	II	F,I

Total Collected: 9 Diversity: 0.50
Number of Taxa: 2 Equitability: 0.50

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	1	1	--	--	--
Percent	50.0	50.0	--	--	--

Beck's Biotic Index = 3

Station: ABC-8 Location: Culvert at S.R. 137. Channelized
Replicate: 2 portion, sunlit area.
Date of Collection: February 23, 1978

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Oligochaeta	4		III	T,F
Diptera				
Cricotopus sp.	2	6.2	I	I
Psectrocladius sp.	18	56.2	I	F
Simulium sp.	8	25.0	I	I

Total Collected:	32	Diversity:	1.59
Number of Taxa:	4	Equitability:	1.00

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	3	--	1	--	--
Percent	75.0	--	25.0	--	--

Beck's Biotic Index = 6

Station: SC-7
Replicate: 1

Location: At railroad trestle on Occidental property. Channelized portion with hyacinths, sunlit area.
Date of Collection: February 23, 1978

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Diptera				
Psectrocladius sp.	36	83.7	I	F
Thienemanniella sp.	1	2.3	I	I
Tanytarsus sp.	1	2.3	II	F,I
Polypedilum illinoense	5	11.6	II	F,I

Total Collected: 43
Number of Taxa: 4

Diversity: 0.83
Equitability: 0.50

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	2	2	--	--	--
Percent	50.0	50.0	--	--	--

Beck's Biotic Index = 6

Station: SC-7
Replicate: 2

Location: At railroad trestle on Occidental property. Channelized portion with hyacinths, sunlit area.
Date of Collection: February 23, 1978

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Diptera				
Corynoneura sp.	1	6.7	I	I
Polypedilum illinoense	4	26.7	II	F,I
Psectrocladius sp.	9	60.0	I	F
Thienemanniella sp.	1	6.7	I	I

Total Collected: 15
Number of Taxa: 4

Diversity: 1.47
Equitability: 1.00

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	3	1	--	--	--
Percent	75.0	25.0	--	--	--

Beck's Biotic Index = 7

Station: SC-7
Replicate: 3

Location: At railroad trestle on Occidental property. Channelized portion with hyacinths, sunlit area.
Date of Collection: February 23, 1978

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Oligochaeta	3	8.3	III	T,F
Diptera				
Chironomus sp.	1	2.8	III	T,F
Psectrocladius sp.	31	86.1	I	F
Simulium sp.	1	2.8	I	I

Total Collected: 36
Number of Taxa: 4

Diversity: 0.77
Equitability: 0.50

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	2	--	2	--	--
Percent	50.0	--	50.0	--	--

Beck's Biotic Index = 4

Station: SC-9
Replicate: 1

Location: At bridge on Occidental property, channelized, shaded by brush.
Date of Collection: February 23, 1978

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Trichoptera				
Cheumatopsyche sp.	3	23.1	II	F
Hydropsyche simulans	2	15.4	I	I
Diptera				
Cricotopus sp.	2	15.4	I	I
Polypedilum illinoense	6	46.1	II	F,I

Total Collected:	13		Diversity:	1.83
Number of Taxa:	4		Equitability:	1.25

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	2	2	--	--	--
Percent	50.0	50.0	--	--	--

Beck's Biotic Index = 6

Station: SC-9
Replicate: 2

Location: At bridge on Occidental property, channelized, shaded by brush.
Date of Collection: February 23, 1978

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Trichoptera				
Cheumatopsyche sp.	4	66.7	II	F
Diptera				
Polypedilum *illinoense*	2	33.3	II	F,I

Total Collected: 6
Number of Taxa: 2

Diversity: 0.92
Equitability: 1.00

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	--	2	--	--	--
Percent	--	100.0	--	--	--

Beck's Biotic Index = 2

Station: SC-9
Replicate: 3

Location: At bridge on Occidental property, channelized, shaded by brush.
Date of Collection: February 23, 1978

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Trichoptera				
Cheumatopsyche sp.	3	30.0	II	F
Coleoptera				
Dubiraphia sp.	1	10.0	II	F
Diptera				
Polypedilum illinoense	6	60.0	II	F,I

Total Collected: 10
Number of Taxa: 3

Diversity: 1.30
Equitability: 1.00

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	--	3	--	--	--
Percent	--	100.0	--	--	--

Beck's Biotic Index = 3

Station: SC-9
Replicate: 4

Location: At bridge on Occidental property, channelized, shaded by brush.
Date of Collection: February 23, 1978

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Diptera				
Cricotopus sp.	1	14.3	I	I
Polypedilum illinoense	4	57.1	II	F,I
Psectrocladius sp.	2	28.6	I	F

Total Collected: 7
Number of Taxa: 3

Diversity: 1.38
Equitability: 1.00

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	2	1	--	--	--
Percent	66.7	33.3	--	--	--

Beck's Biotic Index = 5

Station: RC-2
Replicate: 1

Location: 1.5 miles upstream from confluence with Suwannee River, upstream from permanent USGS guaging station. Shaded area in Southern mixed hardwoods.

Date of Collection: February 23, 1978

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Diptera				
Eukiefferiella sp.	7	20.0	I	
Polypedilum illinoense	3	8.6	II	F,I
Simulium sp.	25	71.4	I	I

Total Collected: 35
Number of Taxa: 3

Diversity: 1.11
Equitability: 1.00

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	2	1	--	--	--
Percent	66.7	33.3	--	--	--

Beck's Biotic Index = 5

Station: RC-2
Replicate: 2

Location: 1.5 miles upstream from confluence with Suwannee River, upstream from permanent USGS guaging station. Shaded area in Southern mixed hardwoods.
Date of Collection: February 23, 1978

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Ephemeroptera				
Stenonema smithae	1	3.4	I	I
Diptera				
Simulium sp.	16	55.2	I	I
Corynoneura sp.	1	3.4	I	I
Cricotopus sp.	7	24.1	I	I
Syndiamesa sp.	4	13.8	V	

Total Collected: 29
Number of Taxa: 5

Diversity: 1.70
Equitability: 0.80

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	5	--	--	--	1
Percent	80.0	--	--	--	20.0

Beck's Biotic Index = 8.0

Station: RC-2
Replicate: 3

Location: 1.5 miles upstream from confluence with Suwannee River, upstream from permanent USGS guaging station. Shaded area in Southern mixed hardwoods.

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Ephemeroptera				
Caenis diminuta	1	8.3	III	T
Trichoptera				
Cyrnellus sp.	1	8.3	V	
Diptera				
Simulium sp.	4	33.3	I	I
Corynoneura sp.	1	8.3	I	I
Conchapelopia sp.	3	25.0	V	F
Syndiamesa sp.	2	16.7	V	

Total Collected: 12
Number of Taxa: 6

Diversity: 2.36
Equitability: 1.17

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	2	--	1	--	3
Percent	33.3	--	16.7	--	50.0

Beck's Biotic Index = 4

Station: RC-2
Replicate: 4

Location: 1.5 miles upstream from confluence with Suwannee River, upstream from permanent USGS guaging station. Shaded area in Southern mixed hardwoods.

Date of Collection: February 23, 1978

Taxon	Number Collected	%	Beck's Biotic Class	Pollution Tolerance Classification
Coleoptera				
Microcylloepus sp.	1	11.1	II	I
Diptera				
Simulium sp.	5	55.5	I	I
Psectrocladius sp.	1	11.1	I	F
Conchapelopia sp.	1	11.1	V	F
Cricotopus sp.	1	11.1	I	I

Total Collected: 9
Number of Taxa: 5

Diversity: 1.88
Equitability: 1.00

	Beck's Biotic Class				
Classification	I	II	III	IV	V
Number of Taxa	3	1	--	--	1
Percent	60.0	20.0	--	--	20.0

Beck's Biotic Index = 7

Appendix D List of Scientific and Common Names of plant species in the five-mile Study area.

Scientific Name	Common Name
Acer rubrum	Red Maple
Acer saccharum barbatum	Florida Maple
Algal Bloom	
Andropogon virginicus	Broom Sedge
Andropogon sp.	Beard Grass, Broom-straw
Anthemis sp.	
Aristida stricta	Wire Grass
Aristida sp.	Three Awn Grass
Sorbus arbutifolia	Red Chokeberry
Arundinaria tecta	Switch Cane
Hypericum hypericoides	St. Andrew's Cross
Baccharis halmifolia	Groundsel-tree
Betula nigra	River Birch
Boehmeria cylindrica	False Nettle
Boehmeria drummondiana	False Nettle, Bog-hemp
Campsis radicans	Trumpet Vine, Cow-itch Vine
Carex walteriana	
Carpinus caroliniana	Ironwood, American Horn Beam
Carya floridana	Mockernut Hickory
Carya glabra	Pignut Hickory
Carya sp.	Hickory
Castanea alnifolia	Chinquapin
Centella asiatica	
Cephalanthus occidentalis	Button Bush
Cicuta maculata	Water Hemlock
Cladium jamaicense	Saw Grass
Clethra alnifolia	Sweet Pepperbush, White Alder
Cliftonia monophylla	Buckwheat Tree, Black Titi
Cornus stricta	Swamp Dogwood, Stiff Cornell Dogwood
Cornus spp.	Dogwood
Crataegus aestivalis	Hawthorn, May Haw
Crataegus spp.	Hawthorn
Cyrilla racemiflora	Titi, Leatherwood
Diospyros virginiana	Persimmon
Dulichium arundinaceum	Sedge
Eleocharis vivipara	Spike-rush
Eleocharis sp.	Spike-rush
Fraxinus caroliniana	Water Ash, Pop Ash
Fraxinus pauciflora	Water Ash, Florida or Swamp Ash
Gaylussacia frondosa	Dangleberry, Huckleberry
Gordonia lasianthus	Loblolly Bay
Hydrocotyle umbellata	Marsh Pennywort
Hydrocotyle sp.	

Scientific Name	Common Name
Hypericum sp.	St. John's Wort
Ilex cassine	Dahoon
Ilex coriacea	Large or Sweet Gallberry
Ilex decidua	Possum Haw
Ilex glabra	Bitter Gallberry
Ilex opaca	American Holly
Iris sp.	Iris
Itea virginica	Virginia Willow
Juncus effusus	Soft Rush
Juncus sp.	
Kalmia hirsuta	
Lemna sp.	Duckweed
Leucothoe racemosa	Fetter-bush
Liquidambar styraciflua	Sweet-gum
Lonicera sempervirens	Coral Honeysuckle
Lorinseria areolata	Netted or Dimorphic Chain Fern
Ludwigia sp.	
Lycopus sp.	
Lyonia ferruginea	Stagger-bush
Lyonia ligustrina	Male-berry, Male-blueberry
Lyonia lucida	Fetterbush
Lyonia mariana	Staggerbush
Magnolia grandiflora	Bull Bay, Southern Magnolia
Magnolia virginiana	Sweet Bay
Mikania sp.	Climbing Hempweed
Murdannia keisak	
Myrica cerifera	Wax Myrtle
Nymphaea odorata	Water-lily
Nyssa biflora	Black Gum, Swamp Tupelo
Nyssa ogeche	Ogeechee Tupelo
Nyssa sylvatica	Black Gum, Black Tupelo
Obolaria virginica	Pennywort
Osmunda cinnamomea	Cinnamon Fern
Osmunda regalis	Royal Fern
Panicum albomarginatum	
Panicum bartowense	
Panicum commutatum	
Panicum hemitomon	Maidencane
Panicum scabriusculum	
Panicum sp.	
Parthenocissus quinquefolia	Virginia Creeper
Persea borbonia	Red Bay
Persea palustris	Swamp Bay
Pieris phillyreifolia	Climbing heath
Pinus elliottii	Slash Pine

Scientific Name	Common Name
Pinus palustris	Long-leaf Pine
Pinus taeda	Loblolly Pine
Polygonum hydropiperoides	Mild Water-pepper
Polygonum sp.	
Polytrichum commune	
Pontederia lanceolata	Pickerelweed
Prunus serotina	Black Cherry
Pteridium aquilinum	Bracken Fern
Quercus falcata	Red Oak
Quercus incana	Bluejack Oak
Quercus laurifolia	Laurel Oak, Darlington Oak
Quercus laevis	Turkey Oak
Quercus michauxii	Swamp Chestnut Oak
Quercus myrtifolia	Myrtle Oak
Quercus nigra	Water Oak
Quercus stellata	Post Oak
Quercus virginiana	Live Oak
Rhododendron canescens	Sweet-wild Azalea
Rhododendron viscosum var. serrulatum	Swamp Honeysuckle, Swamp Azalea
Rhododendron sp.	Azalea
Rhus radicans	Poison Ivy
Rorippa islandica	Yellow Cress
Rosa palustris	Swamp Rose
Rubus sp.	Blackberry
Sagittaria sp.	Arrowhead, Duck-potato
Salix caroliniana	Swamp Willow
Sassafras albidum	Sassafras
Saururus cernuus	Lizard's Tail
Sebastiania fruticosa	Sebastian-bush
Serenoa repens	Saw Palmetto
Smilax sp.	Greenbrier
Sphagnum sp.	
Styrax americana	Storax
Taxodium distichum	Bald Cypress
Tilia floridana	Basswood
Hypericum virginicum	
Typha sp.	Cat-tail
Ulmus floridana	Florida Elm
Vaccinium amoenum	
Vaccinium arboreum	Sparkleberry
Vaccinium elliottii	Elliott's Blueberry
Vaccinium fuscatum	
Vaccinium stamineum	Squaw-huckleberry, Gooseberry, Deerberry

Scientific Name	Common Name
Viburnum nudum	Possum-haw Viburnum
Viburnum obovatum	Walter Viburnum
Vitis sp.	Grape
Woodwardia virginica	Virginia Chain-fern

APPENDIX E

METHODS

Macroinvertebrates

Macroinvertebrate sampling consisted of Ekman grab samples and modified Hester-Dendy (Hester and Dendy, 1962) multiple plate samples (EPA, 1973) taken during October, 1977 and February, 1978.

Standard Ekman grabs (232.2 cm^2) were taken at equal intervals in sequence from the channel left, center and right beginning at the downstream end of each station. Four replicates, each composed of three composited grabs were taken at each station. Replicates were kept separate as basic analysis units.

Four multiple plate samplers, each having an effective area of 0.13 m^2, were exposed at each station four weeks prior to collection (DER, 1975). Each sampler was suspended in the euphotic zone of the stream at each station.

During the sampling periods several environmental conditions were characterized since these factors influence the structure of macroinvertebrate communities. Substrate type, current velocity and water depth were characterized. Sufficient sediment was collected to conduct particle size analysis and organic litter content (Holme and McIntyre, 1971). Current velocity was determined within the sampling area using a Marsh-McBirney Model 201 meter. Average depth was recorded at each station.

Samples received preliminary field processing. The Ekman samples were passed through a U.S. standard No. 30 seive. The retained material was preserved in 70% ethanol and rose bengal stain. Hester Dendy samplers were dismantled, placed in a plastic bucket of water, brushed clean and the material passed through a No. 30 seive. The retained material was preserved in 70% ethanol.

All samples were sorted and picked by hand. The picked organisms were transferred to vials containing 70% ethanol. All organisms were identified to the lowest possible taxon by Dr. Philip T. P. Tsui (Calgary, Canada).

The "baseline condition" of each station was evaluated using the following methods: Biotic Index (Beck, 1954; Beck, 1955); Species Diversity Index -- Shannon Weaver Function; Equitability (McArthur, 1957; Lloyd and Ghelardi, 1964); Standing Crop (no./m^2); published water quality tolerances of individual species (EPA, 1973) and overall stream sensitivity based on diversity and species composition.

Periphyton

Periphyton samples were taken by suspending an artificial substrate sampler approximately six inches below the surface at each station (DER, 1975). Each sampler contained 28, 1x3 inch glass microscope slides. The samplers were placed vertically in the water and allowed to incubate for four weeks.

A minimum of four replicate slides were taken for each analysis (EPA, 1973). Four randomly selected slides per sampler were used for identifications and counts. These slides were scraped, composited and preserved in 1% Lugol's solution. Organisms were identified to the lowest possible taxon. Counts were made using the Sedgwick-Rafter strip count technique (EPA, 1973).

A set of four slides/sampler were used for the biomass determinations. Dry weight at 105° C and ash weight at 500° C were determined and ash free dry weight in g/m^2 were calculated.

Four slides/sampler were used to determine chlorophyll-a content (mg/m^2). The slides were scraped and dispersed in 90% aqueous acetone and stored in the dark on ice. Analysis of chlorophyll-a was made using the trichromatic method (EPA, 1973).

The existing periphyton communities were evaluated for standing crop (cells/mm^2), dry weight (g/m^2), ash weight (g/m^2) and ash-free weight (g/m^2) and chlorophyll-a content.

Fish

Fish collections were made at three locations from each sampling area within Rocky, Roaring, Swift and Hunter Creeks. A 0.25 in. mesh seine and an upstream block seine were used to quantitatively sample a known area of stream length. The block net was placed upstream of the seine and the latter moved to it. The seine was carefully pulled clear of the water while remaining in contact with the block net.

The surface area of each segment sampled was determined by measuring segment length and a minimum of five stream widths.

Fish collected were preserved in 10% formalin and identified by Dr. Carter Gilbert, Florida State Museum, University of Florida, Gainesville, Florida.

Species, number of organisms and weights for each catch were determined.

Vegetation

Vegetation Mapping

Photomosaic baseline vegetation maps of the Swift Creek watershed and an area encompassing a five mile radius around the proposed chemical complex were constructed using ASCS, 1973 black and white aerial photographs (Scale 1:40,000). Within the two units, areas accessible by road were ground-truthed. The vegetation communities were delineated and named according to Monk (1968). Approximately 50% of each area was covered in this manner. Remaining areas were compared to ground-truthed areas using a stereoscope and named accordingly.

The acreage occupied by each community observed within the five mile radius of the proposed chemical complex was determined using a modified dot system. A grid system of vertical and horizontal lines (each unit approximately 17.7 acres, or 0.03% of the total) was randomly placed over the final vegetation map. The community occupying the position corresponding to each intersection of horizontal and vertical lines on the grid was tabulated. The number of tabs corresponding to a community was summed and expressed as a percent of the total number of tabs. This percentage was used in calculating the acreage occupied by the community within the five mile radius.

Vegetation Sampling

Eight vegetation sampling stations were located along Swift Creek. Criteria used in establishing sample areas were as follows: each area sampled was located along the natural stream channel or along a channelized segment of it. All major community types adjacent to the stream, i.e., southern mixed hardwoods, cypressheads, bayheads, mixed hardwood swamps and channelized segments through a flatwoods area were sampled. Sample areas were included in each of the major segments of the stream profile.

At each sampling station a combination of vegetation sampling procedures was used to characterize the streamside vegetation. To determine the importance of overstory species, a "point-quarter plotless sampling" of ≥4 in. dbh trees was made parallel to one side of the creek. Twenty points were spaced ten meters apart along the creek; the closest tree in each quarter was identified to species; the dbh meaured, and the distance from the point to the tree was estimated using a range finder. From the data gathered, relative density, basal areas and relative frequency were determined and then combined to determine the importance value of each species according to Cottam and Curtis (1956).

The coverage of aquatic herbaceous plants was tabulated within the creek along 100 foot line transects within the stream channel and parallel to it. All species found above or below points spaced at 2-foot intervals were identified and percent cover of each species determined.

In addition, line transects oriented perpendicular to the stream channel were used to determine changes in vegetation as one moved away from mid-channel. At three-foot intervals all plants encountered above or below the point were tabulated by species name and the station occupied. Percent cover of each species was determined as described previously.

Within areas affected by mining operations (i.e. clay settling areas, tailings, mined pits and reclaimed areas) vegetation was sampled either with 100-foot line transects (described above) or through casual observations. Species abundance was determined through percent cover calculations or by visual estimates.

Mammals

A characterization of the mammalian fauna within the five mile radius of the proposed chemical complex was accomplished using a variety of methods. Based upon available habitat and range maps, an expected species list of the area was developed (Jennings, 1958; Hall and Kelson, 1959; FGFWFC, 1976; NFWL, 1978). This list was then compared with species that were either observed or caught during the acquisition of baseline data. Intermediate and large mammal presence was determined by track counts along dike roads and dirt roads. Chiropteran presence was determined by an ultrasonic detector that detects bat vocalizations. Subsequent night-lighting was used to attempt species identification and verification. Small mammals were quanitatively sampled in natural habitats, the Swift Creek Mine area and the Suwannee River Mine area.

Natural habitat sampling in the Swift Creek watershed consited of running four transects per habitat type (i.e. high pineland, flatwoods, mixed hardwoods and forested swamps) for three consecutive nights. Transects were 150 meters in length with ten equally spaced trap stations. Each trap station had two snap traps baited with rolled oats and peanut butter.

Swift Creek mine area sampling consisted of four transects per mine phase (i.e. sand-tailings, inactive settling area, unreclaimed mine). The configuration of transects and duration of trapping was the same as for natural habitats.

Sampling within the Suwannee River Mine area consisted of running four transects/mine phase except the sand-tailings area which had only two transects. The length of transects and number of trap stations was the same as for the above areas. However, two transects within each mine phase were composed of snap traps, while two were composed of Sherman live traps. Only one trap/station was used in the Suwannee River Mine area.

Captured animals were identified, sexed, aged, weighted, measured, preserved and deposited in the Florida State Museum, Gainesville, Florida. Results of the trapping was expressed in terms of relative abundance based on trap success. Trap success was expressed as the number individuals captured per 100 trap nights for the basis of comparisons.

Avifauna

A characterization of the avifauna was accomplished using a variety of methods. Based on available habitat and range maps, an expected species list of the area was developed (Robbins, et al., 1966; Stevenson, 1976; Sprunt, 1954). This list included all species observed during the study. General surveys included: 1) driving roads and making 0.25 mile stops for observation points, 2) walking through areas, 3) night driving and playing tapes for owls and 4) playing screech owl tapes to attract small birds. General surveys for endangered species included: 1) playing recording of red-cockaded woodpecker in potential habitat areas, 2) trapping and measuring kestrels to determine subspecies, 3) observing eagles and their usage of the area.

Quantitative sampling consisted of IPA counts (Indice Pointual I'Abondance) conducted in four habitats surrounding the Suwannee River Mine area, three habitats surrounding the Swift Creek Mine area and seven natural habitats located within the Swift Creek watershed (Blondel et al., 1970).

The IPA method consisted of four, fifteen-minute counts at a fixed location during the first few hours after sunrise. All vocalizations and visual sightings were recorded. The method yields an index (birds/hour) which allows relative abundance to be determined.

Herptiles

No formal herptile sampling was conducted due to the technical data acquisition phase of the project occurring during the winter months. An expected species list was prepared from available range maps and preferred habitat within the project area (Conant, 1975; FGFWFC, 1976; NFWL, 1978). This list was supplemented by observations made during other field surveys and on several occasions at night. During night surveys, roads within the project area were cruised. Identifications were made visually and audially.

LITERATURE CITED

Beck, W.M., Jr. 1954. Studies in stream pollution biology. I. A simplified ecological classification of organisms. Quart. J. Fla. Acad. Sci. 17:211-227.

Beck, W.M., Jr. 1955. Suggested method for reporting biotic data. Sew. Indus. Wastes 27:1193-1197.

Blondell, J., L. Ferry and B. Frochst. 1970. La methode des indices pouctuels d'avifauna per stations d'encoute. Alauda 38:55-71.

Conant, R. 1975. A field guide to reptiles and amphibians of eastern and central North America. Houghton Mifflin Co., Boston. 429pp.

Cottam, G. and J.T. Curtis. 1956. The use of distance measures in phytosociological sampling. Ecology 37:451-460.

DER (Department of Environmental Regulation, Florida). 1975. Permanent network system. Biological program. Tallahassee. 11pp.

EPA (U.S. Environmental Protection Agency). 1973. Biological field and laboratory methods for measuring the quality of surface waters and effluents. Off. Res. Dev. U.S. EPA, Cincinnati, Ohio 171pp.

FGFWFC (Florida Game and Fresh Water Fish Commission). 1976. Cross Florida Barge Canal restudy report. Wildlife study. Dept. Army, Corps of Engineers, Jacksonville District. 5 vol.

Hall, E.R. and K.R. Kelson. 1959. The mammals of North America. Ronald Press. N.Y. 2 vols. 1083pp.

Hester, F.E. and J.S. Dendy. 1962. A multiple-plate sampler for aquatic macroinvertebrates. Trans. Amer. Fish. Soc. 91:420-421.

Holme and McIntyre. 1971.

Jennings, W.L. 1958. The ecological distribution of bats in Florida. Ph.D. Thesis, Univ. of Florida. 126 pp.

Lloyd, M. and R.J. Ghelardi. 1964. A table for calculating the "equitability" component of species diversity. J. Anim. Ecol. 33:217-225.

McArthur, R.H. 1957. On the relative abundance of bird species. Proc. Nat. Acad. Sci., Washinton. 43:293-295.

Monk, C.D. 1968. Successional and environmental relationships of the forest vegetation of north-central Florida. Amer. Midl. Nat. 79:441-457.

NFWL (National Fish and Wildlife Laboratory). 1978. Osceola National Forest phosphate extraction and processing: imacts on federally listed threatened or endangered species and other species of concern. Off. Biol. Serv., Fish and Wild. Serv., U.S.D.I., Washington, D.C. 414 pp.

Robbins, C.S., B. Bruur and H.S. Zim. 1966. Birds of North America. Golden Press, N.Y. 340 pp.

Sprunt, A. 1954. Florida birdlife. Coward-McCann, N.Y. 527 pp.

Stevenson, H.M. 1976. Vertebrates of Florida. Univ. of Florida Press, Gainesville, Florida. 607 pp.

LITERATURE CITED
(Section 2.7)

Allen, E.R. and W.T. Neill (1950), "The alligator snapping turtle, Macroclemys temmincki in Florida"; Ross Allen Reptile Inst. Spec. Publ. 4.

Ansely, C.C. (1952), "An ecological comparison of the mesic hardwoods forests of central Florida"; M.S. Thesis, University of Florida.

Auffenberg, W. (1966), "On the courtship of Gopherns polyphemus"; Herpetologica 22:113-117.

Austin, Oliver L., Jr. (1965), "Louisiana Waterthrush (Seiurus motacilla) nesting in Gainesville"; Fla. Nat. 38:144.

Barbour, R.W. and W.H. Davis (1969), "Bats of North America"; Univ. Press Kentucky, Lexington.

Bass, D.G., Jr. (1971), "Sport fishery of the Suwannee River"; Report I. December 1971. Florida Game and Fresh Water Fish Commission.

Bass, D.G., Jr. (1971),"Sport fishery of the Suwannee River"; Florida Game and Fresh Water Fish Commission.

Bass, D.B., Jr. and V.G. Hitt (1973), "Sport fishery ecology of the Suwannee and Santa Fe Rivers, Florida. Report II. Distribution and life history aspects of the Suwannee bass, Micropterus notius Bailey and Hubbs." Florida Game and Fresh Water Fish Commission, Lake City, Florida.

Beck, W.M., Jr. (1954), "Studies in stream pollution biology. I. A simplified ecological classification of organisms." Quart. J. Fla. Acad. Sci. 17:211-227.

Beck, W.M., Jr. (1955), "Suggested method for reporting biotic data." Sew. Indust. Wastes 27:1193-1197.

Bent, A.C. (1961), "Life histories of North American birds of prey." Dover Publ., New York.

Berry, J.F. (1976), "The Spotted turtle in J.N. Layne, ed. Inventory of rare and endangered biota of Florida." Florida Audubon Society and Florida Defenders of the Environment. Microfilm.

Berry, J.F. and C.S. Gidden (1973), "The Spotted turtle in Florida and southern Georgia." Fla. Sci. 36:198-200.

Birkenholz, D.E. (1972),"Neofiber alleni"; Mamm. Species 15:1-4.

Bishop, S. (1947), "Handbook of salamanders", Cornell Univ. Press, Ithica.

Blair, W.F. and J.D. Kilby (1936), "The gopher mouse--Peromyscus floridanus"; J. Mamm. 17:421-422.

Blondel, J., L. Ferry and B. Frochot (1970), "La methode des incides pouctuels d'avivauna par stations d'encoute"; Alauda 38:55-71.

Boughey, A.A., R.L. Moreau, R.W. Winters and P. Lagos (1976), "Comprehensive plan for Hamilton County, Florida: Vol. 1"; Barr, Dunlop and Associates, Inc., Tallahassee, Florida.

Braun, E.L. (1950), "Deciduous forests of eastern North America"; The Blakiston Co., Philadelphia.

Brown, L.N. (1976a), "The southern mink" in J.N. Layne, ed. Inventory of rare and Endangered biota of Florida. Fla. Audubon Society and Florida Defenders of the Environment. Microfilm.

Brown, L.N. (1976b), "The southeastern weasel" in J.N. Layne, ed. Inventory of rare and endangered biota of Florida. Florida Audubon Society and Florida Defenders of the Environment. Microfilm.

Brown, L.N. (1976c), "The southeastern shrew" in J.N. Layne, ed. Inventory of rare and endangered biota of Florida. Florida Audubon Society and Florida Defenders of the Environment. Microfilm.

Cade, T.J. (1974), "Plans for managing the survival of the peregrine falcon" in Management of Raptors. Raptor Res. Report.

Campbell, H.W. (1976), "The short-tailed snake" in J.N. Layne, ed. Inventory of rare and endangered biota of Florida. Florida Audubon Society and Florida Defenders of the Environment. Microfilm.

Campbell, H.W. and J.A. Powell (1976), "Endangered species: the Florida manatee"; Florida Nat. April:15-20.

Carr, A.F. (1940), "A contribution to the herpetology of Florida"; Univ. Florida Publ. Biol. Sci. Ser. 3:1-118.

Carr, A.F. (1952), "Handbook of turtles of the United States, Canada and Baja, California." Cornell Univ. Press, Ithaca.

Chapman, F.M. (1966), "Handbook of birds of eastern North America". New York, Dover Publ.

Christman, S.P. and H.I. Kochman (1975), "The southern distribution of the many-lined salamander, Stereochilus marginatus." Fla. Sci. 38:140-141.

Christman, S.P. (1976a), "The many-lined salamander" in J.N. Layne, ed. Inventory of rare and endangered biota of Florida. Florida Audubon Society and Florida Defenders of the Environment. Microfilm.

Christman, S.P. (1976b), "The striped newt" in J.N. Layne, ed. Inventory of rare and endangered biota of Florida. Florida Audubon Society and Florida Defenders of the Environment. Microfilm.

Cliburn, J.W. and C.G. Jackson (1975), "Rare and endangered amphibians and reptiles in Mississippi"; Mississippi Rare and Endangered Species Committee. A preliminary list of rare and threatened vertebrates in Mississippi. Mississippi Game and Fish Commission.

Conant, R. (1975), "A field guide to reptiles and amphibians of eastern and central North America"; Houghton Mifflin Co., Inc. Boston.

Cox, D.T. (1969), "Stream investigations: annual progress report"; Res. Prog. F-25-2; Florida Game and Fresh Water Fish Commission.

Cox, D.T. (1970), "Stream investigations: annual progress report"; Res. Prog. F-25-3; Florida Game and Fresh Water Fish Commission.

EPA (1973), "Biological field and laboratory methods for measuring the quality of surface waters and effluents"; National Environmental Research Center, Office of Research and Development, U.S. EPA, Cincinnati, Ohio.

EPA (1977), "Non point source--stream nutrient level relationships: a nationwide survey"; Ecological Research Series EPA 600/3-77-105; Environmental Research Laboratory, Corvalis, Oregon.

Ehrhart, L.M. (1976), "The shermans fox squirrel" in J.N. Layne, ed. Inventory of rare and endangered biota of Florida; Florida Audubon Society and Florida Defenders of the Environment. Microfilm.

FGFWFC (Florida Game and Fresh Water Fish Commission) (1976), "Cross-Florida Barge Canal restudy report"; Wildlife Study; Department of the Army, Jacksonville District Corpos of Engineers, Jacksonville, Florida.

FGFWFC (1977), "Wildlife code of the state of Florida"; Florida Game and Freshwater Fish Commission, Tallahassee.

Fisk, E.J. (1976), "Least tern" in J.N. Layne, ed. Inventory of rare and endangered biota of Florida; Florida Audubon Society and Florida Defenders of the Environment. Microfilm.

Florida Division of Forestry (1978), Commercial ownership map; Office in Live Oak, Florida.

Fogarty, M.J. (1976a), "The American alligator" in J.N. Layne, ed. Inventory of rare and endangered biota of Florida. Florida Audubon Society and Florida Defenders of the Environment. Microfilm.

Fogarty, M.J. (1976b), "The Florida gopher frog"; in J.N. Layne, ed. Inventory of rare and endangered biota of Florida, Florida Audubon Society and Florida Defenders of the Environment. Microfilm.

Friensehner, H.S. (1977), "Update, 1976, Florida and timber resources"; Florida Division of Forestry, Department of Agricultural and Conservation Serv., Tallahassee, Florida.

Florida State Museum (Undated), "The Florida State Museum herpetology newsletter"; Compiled by R.E. Ashton, Division of Herpetology and Department of Interpretation. Florida State Museum, Gainesville.

Gilbert, C.R. (1973), "Rare and endangered fishes of the Osceola National Forest area"; Unpublished manuscript to U.S. Dept. Agric., For. Serv.

Gilbert, C.R. (1976a), "The Atlantic sturgeon"; in J.N. Layne, ed. Inventory of rare and endangered biota of Florida. Florida Audubon Society and Florida Defenders of the Environment. Microfilm.

Gilbert, C.R. (1976b), "The Eastern mudminnow"; in J.N. Layne, ed. Inventory of rare and endangered biota of Florida. Florida Audubon Society and Florida Defenders of the Environment. Microfilm.

Gilbert, C.R. (1976c), "The Mud sunfish"; in J.N. Layne, ed. Inventory of rare and endangered biota of Florida. Florida Audubon Society and Florida Defenders of the Environment. Microfilm.

Gilbert, C.R. (1976d), "The Suwannee bass"; in J.N. Layne, ed. Inventory of rare and endangered biota of Florida. Florida Audubon Society and Florida Defenders of the Environment. Microfilm.

Hall, E.R. (1951), "American weasels"; Univ. Kansas Mus. Nat. Hist. Misc. Publ. 4:1-466.

Hall, E.R. and E.L. Cockrum (1953), "A synopsis of the North American microtine rodents"; Univ. Kansas Mus. Nat. Hist. Misc. Publ. 5:378-498

Hall, E.R. and K.R. Kelson (1959), "The mammals of North America"; Ronald Press, New York.

Hammerstrom, F., T.Ray, C.M. White and C.E. Braun (1975), "Conservation committee report on status of eagles"; Wilson Bull. 87:140-143.

Hansen, K.L. (1953), "The burrow of the gopher tortoise"; Quart. J. Fla. Acad. Sci. 26:353-360.

Harlow, R. (1962), "Black bear population investigation"; Job completion report, Project No. W-41-R-9, Florida Game and Fresh Water Fish Commission.

Harper, R.M. (1906), "A phytogeographic sketch of the Altamaha Grit region of the coastal plain of Georgia"; Ann. N.W. Acad. Sci. 17:1-415.

Harper, F. (1927), "The mammals of the Okefenokee Swamp region of Georgia"; Proc. Boston Soc. Nat. Hist. 38:191-396.

Hartman, D.S. (1971), "Behavior and ecology of the Florida manatee, *Trichechus manatus latirostris* (Harlan) at Crystal River, Citrus County Florida"; Ph.D. Dissertation. Cornell Univ., Ithaca.

Hartman, D.S. (1974), "The Manatee"; *in* J.N. Layne, ed. Inventory of rare and endangered biota of Florida, Florida Audubon Society and Florida Defenders of the Environment.

Hickey, J.J. (1969), "Peregrine falcon populations"; Univ. of Wisc. Press, Madison, Wisc.

Hillestad, H.O., D.B. Means and W.W. Bakers, Eds. *in* press. Endangered and threatened vertebrates of the southeastern United States. Tall Timbers Res. Stn. Misc. Publ. 4.

Holder, D.R., H.Wyatt, and W.D. Hill, Jr. (1970), "Benthos studies in warm water streams"; Ann. Prog. Report F-21-1, July 1, 1968 - June 30, 1969.

Hubbell, T.H., A.M. Laessle and L.C. Dickinson (1956), "The Flint-Chattahoochee-Apalachicola region and its environment"; Bull. Fla. St. Museum 1:1-72.

Huff, J.A. (1975), "Life history of Gulf of Mexico sturgeon, *Acipenser oxyrhynchus clesotoi*, in Suwannee River, Florida"; Florida Mar. Res. Publ. No. 16.

Humphrey, S.R. (1975), "Nursery roosts and community diversity of nearctic bats"; J. Mamm. 56:321-346.

Humphrey, S.R. and M.D. Tuttle (1976), "The Gray bat"; *in* J.N. Layne ed. Inventory of rare and endangered biota of Florida. Florida Audubon Society and Florida Defenders of the Environment.

Jennings, W.J. (1958), "The ecological distribution of bats in Florida"; Ph.D. Thesis, University of Florida, Gainesville.

Johnson, P.T. and J.N. Layne (1961), "A new species of *Polygenis jordan* from Florida, with remarks on host relationships and zoogeographic significance"; Proc. Entomol. Soc. Wash. 63:115-123.

Kockman (1976), "The Indigo sanke"; *in* J.N. Layne, ed. Inventory of rare and endangered biota of Florida"; Florida Audubon Society and Florida Defenders of the Environment.

Kurz, H. (1944), "Secondary forest succession in the Tallahasee Red Hills"; Proc. Fla. Acad. Sci. 7:1-100.

Laessle, A.M. (1952), "The plant communities of the Welaka area"; University of Florida Press, Gainesville. Biol. Sci. Ser. 4:1-143.

Laessle, A.M. (1958), "The origin and successional relationships of sandhill vegetation and sandpine scrub"; Ecol. Monogr. 28:361-382.

Laessle, A.M. and C.D. Monk (1961), "Some live oak forests of northeastern Florida"; Fla. Acad. Sci. 24:30-55.

LaMoreaux, P.E. and Associates and Breedlove and Associates (1977), "A determination of the extent of the Department of Environmental Regulation's dredge and fill jurisdiction on the Occidental Chemical Company Property in Hamilton County, Florida", Occidental Chemical Company, White Springs, Florida 220 pp.

Layne, J.N. (1963), "A study of the parasites of the Florida mouse, Peromyscus floridanus in relation to host and environmental factors"; Tulane Stud. Zool. 11:1-27.

Layne, J.N. (1974), "The land mammals of south Florida"; in P.J. Gleason, ed. Environments of South Florida: present and past. Memoir 2, Miami Geol. Soc.

Layne, J.N. (ed.) (1976a),"Inventory of rare and endangered biota of Florida"; Florida Audubon Society and Florida Defenders of the Environment.

Layne, J.N. (1976b), "The Florida mouse"; in J.N. Layne, ed. Inventory of rare and endangered biota of Florida. Florida Audubon Society and Florida Defenders of the Environment.

Lowery, G.H. (1974), "The mammals of Louisiana and its adjacent waters"; Louisiana State Univ. Press.

Marchand, L.J. (1942), "A contribution to the knowledge of the natural history of certain freshwater turtles"; M.S. Thesis. Univ. of Florida, Gainesville.

McClure, J.P. (1970), "Forest statistics for northeast Florida"; USDA Forest Service Res. Bull. SE-15, Ashville, N.C.

McCollum, J.L. (ed.) (1974), "Endangered species of Georgia"; Georgia Dept. Nat. Resources, Atlanta.

Means, D.B. and S.P. Christman (1976), "The Carpenter frog"; in J.N. Layne, ed. Inventory of rare and endangered biota of Florida, Florida Audubon Society and Florida Defenders of the Environment.

Monk, C.D. (1965), "Southern mixed hardwood forest of north-central Florida"; Ecological Monog. 35:335-354.

Monk, C.C. (1968), "Successional and environmental relationships of the forest vegetation of north central Florida", Amer. Midl. Wat. 79:441-457.

Moore, J.C.(1945), "Life history notes on the Florida weasel"; Proc. Fla. Acad. Sci. 7:237-263.

Moore, J.C. (1946), "Mammals from Welaka, Putnam County, Florida"; J. Mamm. 27:49-59.

Moore, J.C. (1951), "The range of the Florida manatee"; Quart. J. Fla. Acad. Sci. 14:1-19.

Moore, J.C. (1957), "The natural history of the fox squirrel, Sciurus niger shermani"

Mount, R.H. (1975), "The reptiles and amphibians of Alabama"; Auburn Univ.

Nesbitt, S.A. (1973), "Wood stork nesting in north Florida"; Fla. Field Nat. 1:No. 2.

National Fish and Wildlife Laboratory (1978), "Osceola National Forest phosphate extraction and processing: impacts on endangered species"; Office of Biological Survey, USFWS, Department of the Interior.

Odum, E.P. (1971), "Fundamentals of ecology"; W.B. Saunders Co., Philadelphia.

Ogden, J.C., J.A. Kushland and J.T. Tilment (1976), "Prey selectivity of the Woodstork"; Condor 78(3):324-330.

Oosting, H.F. (1956), "The study of plant communities"; W.H. Freeman Co.

Owre, I.T. (1976), "Hairy woodpecker"; in J.N. Layne (ed.). Inventory of rare and endangered biota of Florida. Florida Audubon Society and Florida Defenders of the Environment.

Peckman, R.S. and C.F. Dineen (1957), "Ecology of the central mud-minnow, Umbra limi (Kirtland)"; Am. Midl. Nat. 58:222-231.

Peterson, D.W. and W.B. Robertsons, Jr. (1976), "The southern bald eagle"; in N.N. Layne, (ed.), Inventory of rare and endangered biota of Florida. Florida Audubon Society and Florida Defenders of the Environment.

Phillips, G.L. (1966), "Ecology of the big brown bat (Chiroptera: Vespetilionidae) in northeastern Kansas"; Am. Midl. Nat. 75:168-198.

Pritchard, P. (1976), "The Alligatory snapping turtle"; in J.N. Layne, (ed.), In-entory of rare and endangered biota of Florida. Florida Audubon Society and Florida Defenders of the Environment.

Quarterman, E. and C. Keever (1962), "Southern mixed hardwood forest: climax in the southeastern coastal plain"; USA Ecol. Monog. 32:167-185.

Schwartz, A. (1953), "A systematic study of the water rat (Neofiber alleni) Occas. Pap. Mus. Zool. Univ. Mich. 547:1-27.

Seehorn, M.E. (1975), "Fishes of southeastern national forests"; U.S. Dept. Agric., For. Serv. Atlanta.

Smith, G. (1971), "Florida minks"; Fla. Wild. 24:14-15.

Snelson, F.F. (1976), "The Black-banded sunfish"; in J.N. Layne, (ed.), Inventory of rare and endangered biota of Florida. Florida Audubon Society and Florida Defenders of the Environment.

Snyder, P.W., (1976), "Coopers hawk"; in J.N. Layne, (ed.), Inventory of rare and endangered biota of Florida. Florida Audubon Society and Florida Defenders of the Environment.

Sprunt, A. Jr. (1954), "Florida bird life"; New York, Coward-McCann, Inc.

Stevenson, H.M. (1970), "Occurrence of the carpenter frog in Florida"; Quart. J. Fla. Acad. Sci. 32:233-235.

Stevenson, H.M. (1976a), "American Redstart"; in J.N. Layne ed. Inventory of rare and endangered biota of Florida. Florida Audubon Society and Florida Defenders of the Environment.

Stevenson, H.M. (1976b), "White-breasted Nuthatch"; in J.N. Layne ed. Inventory of rare and endangered biota of Florida. Florida Audubon Society and Florida Defenders of the Environment.

Stevenson, H.M. (1976c), "Worm-eating Warbler", in J.N. Layne ed. Inventory of rare and endangered biota of Florida. Florida Audubon Society and Florida Defenders of the Environment.

Stevenson, H.M. (1976d), "Vertebrates of Florida: identification and distribution"; University Press, Gainesville, Florida.

Tilmant, J.T. (1976), "The Round-tailed muskrat"; in J.N. Layne, Inventory of rare and endanagered biota of Florida. Florida Audubon Society and Florida Defenders of the Environment.

USDI (1973), "Threatened wildlife of the United States"; Compiled by the office of Endangered Species and International Activities. Bur. Sport Fish. Wildlife Resour. Publ. 114. U.S. Gov. Printing Office, Washington, D.C.

United States Fish and Wildlife Service (1975), "Threatened or endangered fauna or flora"; Review of status of over 3000 vascular plants and determination of "critical habitats", USDI, 40 FR, 27824-27924; July 1, 1975.

United States Fish and Wildlife Service (1976), "Endangered and threatened wildlife and plants"; proposed endangered status for some 1700 U.S. vascular plant taxa. USDI, 40 FR, 24524-24572; June 16, 1976.

White, L.D., L.D. Harris, J.E. Johnston and D.G. Milchunas (1975), "Impact of site preparation on flatwoods wildlife habiatat"; Annual conference Southeastern Association of Game and Fish Commissioners, 347-353.

Wiley, J.W. (1976), "Southeastern Kestrel"; in J.N. Layne, ed. Inventory of rare and endangered biota of Florida. Florida Audubon Society and Florida Defenders of the Environment.

Williams, L.E., Jr. (1976a), "The Florida panther"; in J.N. Layne, ed. Inventory of rare and endangered biota of Florida. Florida Audubon Society and Florida Defenders of the Environment.

Williams, L.E., Jr. (1976b), "The Florida black bear"; in J.N. Layne, ed. Inventory of rare and endangered biota of Florida. Florida Audubon Society and Florida Defenders of the Environment.

Williams, L.E., Jr. and R.W. Phillips (1972), "North Florida Sandhill Crane populations"; Auk. 89:541-548.

Wright, A.H. and A.A. Wright (1949), "Handbook of frogs and toads of the United States and Canada"; Cornell Univ. Press. Ithaca. 640 pp.

Wright, A.H. and A.A. Wright (1957), "Handbook of snakes"; Cornell Univ. Press. Ithaca. 1105 pp.

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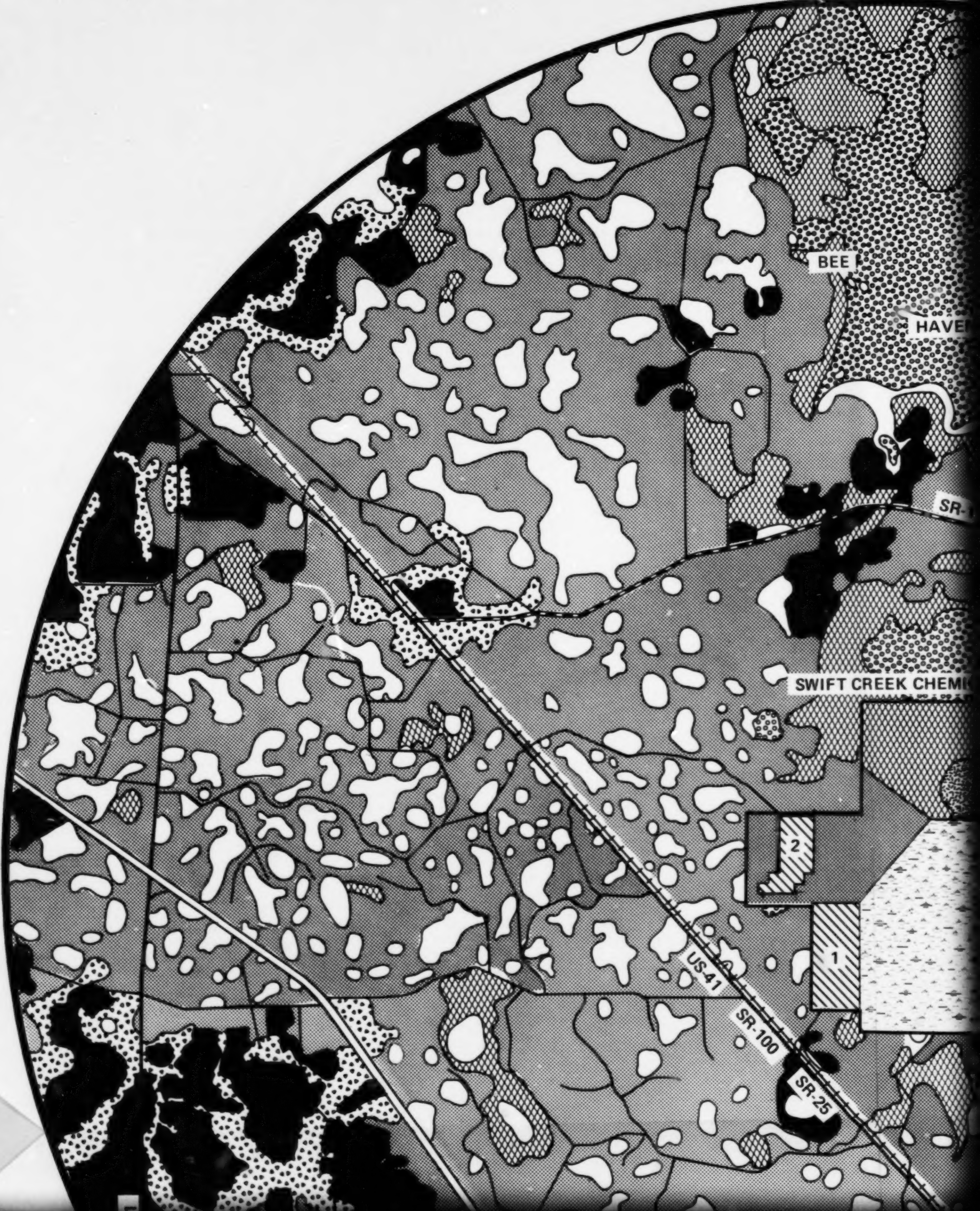

BEE
HAVEN
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SWIFT CREEK CHEMI
2
1
US-41
SR-100
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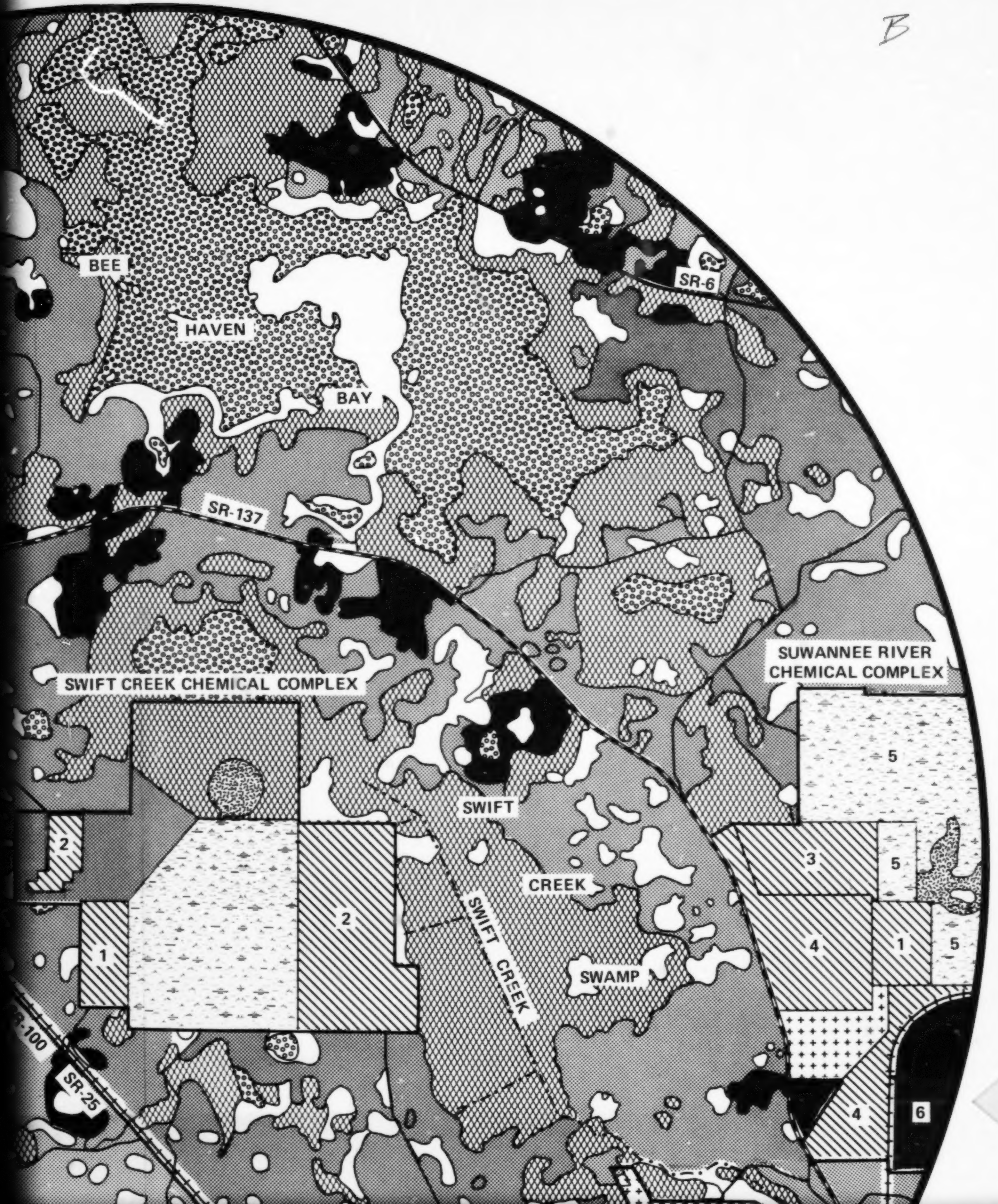
B


BEE
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SR-6
SR-137
SWIFT CREEK CHEMICAL COMPLEX
SUWANNEE RIVER CHEMICAL COMPLEX
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SWIFT
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CREEK
SWIFT CREEK
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SWAMP
SR-100
SR-25
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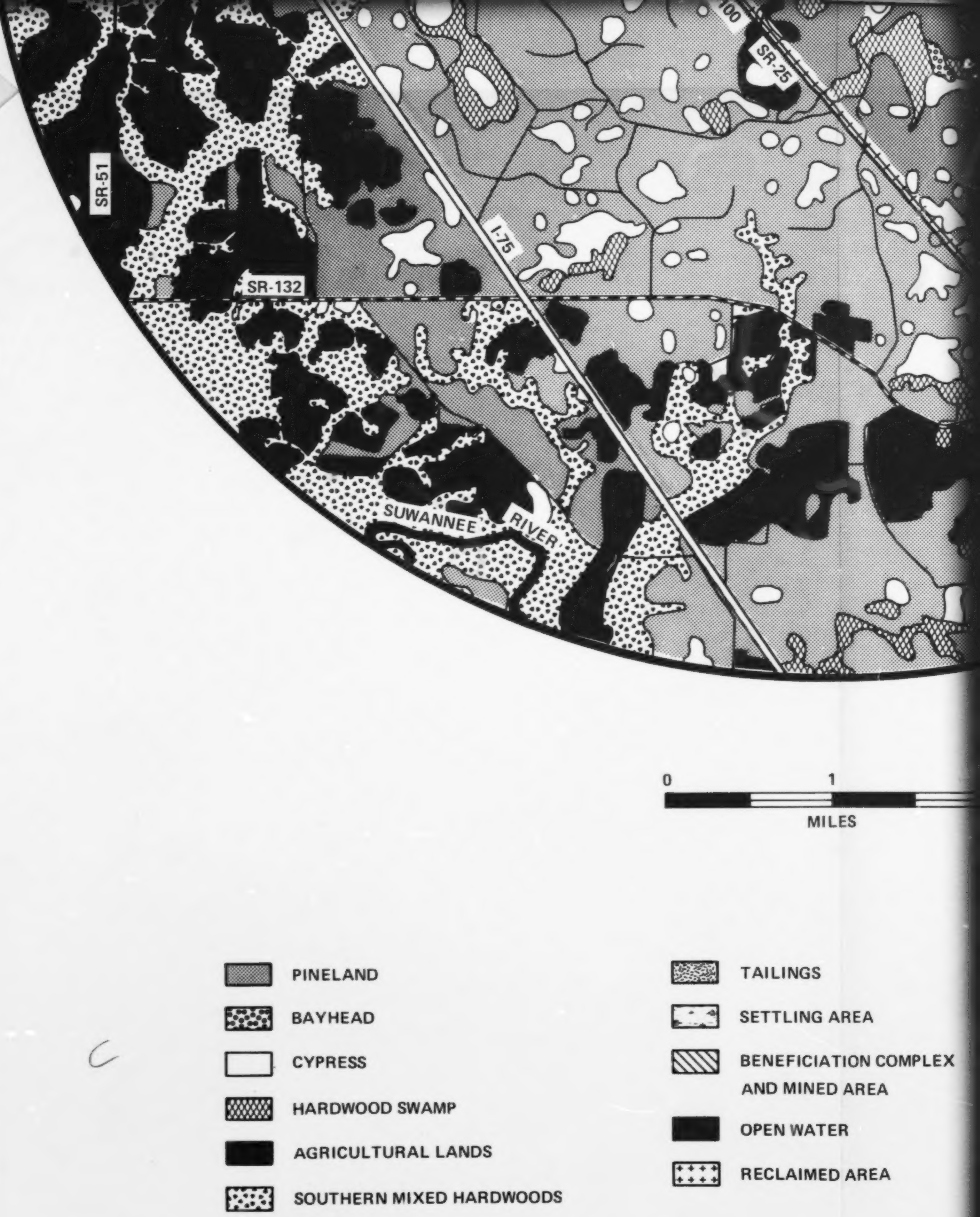
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SR-25
SR-51
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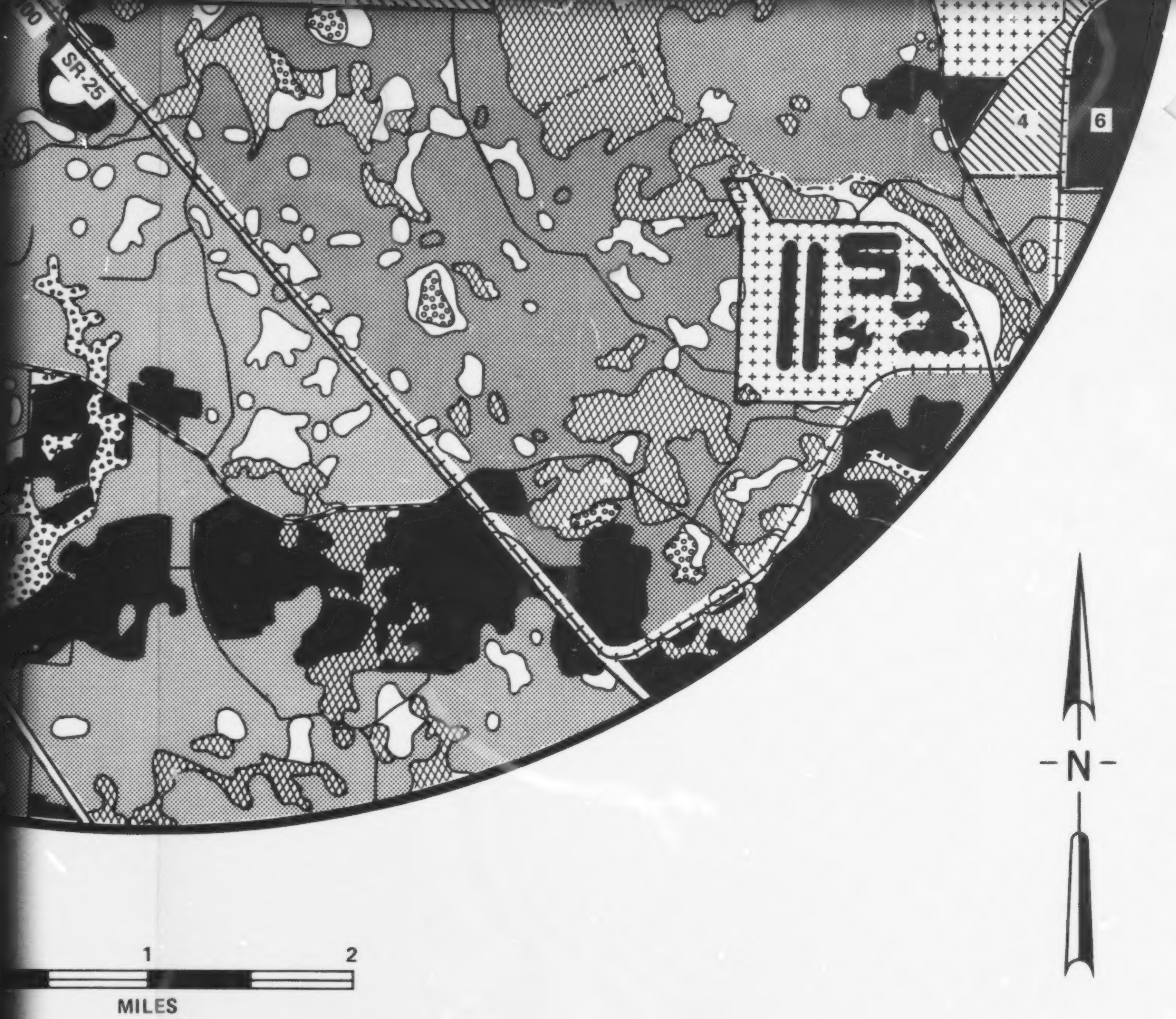
SR-132
SUWANNEE RIVER
0
1
MILES
PINELAND
BAYHEAD
CYPRESS
HARDWOOD SWAMP
AGRICULTURAL LANDS
SOUTHERN MIXED HARDWOODS
TAILINGS
SETTLING AREA
BENEFICIATION COMPLEX AND MINED AREA
OPEN WATER
RECLAIMED AREA

C



TAILINGS

SETTLING AREA

BENEFICIATION COMPLEX
AND MINED AREA

OPEN WATER

RECLAIMED AREA

—	DIRT ROAD
━	CHEMICAL COMPLEX BOUNDARY
—·—·—	STREAM
+++++	RAILROAD
1	BENEFICIATION PLANT
2	MINED AREA
3	GYPSUM STACK
4	COOLING POND
5	INACTIVE SETTLING AREA
6	WATER TREATMENT AREA

D

2- 801

FIGURE 2.7-6 VEGETATION ASSOCIATIONS